Internal Use Only

Service Manual

LG-P970

Date: April, 2011 / Issue 1.0

Table Of Contents

1. INTRODUCTION

1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

1.2 Regulatory Information

A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services.
System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common carrier telecommunication service of facilities accessed through or connected to it. The manufacturer will not be responsible for any charges that result from such unauthorized use.

B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the phones or compatibility with the net work, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

D. Maintenance Limitations

Maintenance limitations on the phones must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

G. Interference and Attenuation

A phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

H. Electrostatic Sensitive Devices

ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the  **sign.**

Following information is ESD handling:

• Service personnel should ground themselves by using a wrist strap when exchange system boards. • When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.

• Use a suitable, grounded soldering iron. • Keep sensitive parts in these protective packages until these are used.

• When returning system boards or parts like EEPROM to the factory, use the protective package as described.

1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current – Constant Voltage
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milli watt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPIB	General Purpose Interface Bus
GSM	Global System for Mobile Communications
IPUI	International Portable User Identity
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LDO	Low Drop Output
LED	Light Emitting Diode
OPLL	Offset Phase Locked Loop

PAM	Power Amplifier Module
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
PLL	Phase Locked Loop
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RLR	Receiving Loudness Rating
RMS	Root Mean Square
RTC	Real Time Clock
SAW	Surface Acoustic Wave
SIM	Subscriber Identity Module
SLR	Sending Loudness Rating
SRAM	Static Random Access Memory
PSRAM	Pseudo SRAM
STMR	Side Tone Masking Rating
TA	Travel Adapter
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
UART	Universal Asynchronous Receiver/Transmitter
VCO	Voltage Controlled Oscillator
VCTCXO	Voltage Control Temperature Compensated Crystal Oscillator
WAP	Wireless Application Protocol

2. PERFORMANCE

2.1 Product Name

P970 : WCDMA900/1900/2100+EGSM/GSM850/DCS/PCS

(HSUPA 5.7Mbps/HSDPA 7.2Mbps / GPRS Class 12 / EDGE Class 12)

2.2 Supporting Standard

Item	Feature	Comment
Supporting Standard	WCDMA(FDD1,2,8)/EGSM/GSM850/DCS1800/PCS1900 with seamless handover Phase 2+(include AMR) SIM Toolkit : Class 1, 2, 3, C-E	
Frequency Range	WCDMA(FDD1) TX : 1920 – 1980 MHz WCDMA(FDD1) RX : 2110 – 2170 MHz WCDMA(FDD2) TX : 1850 – 1910 MHz WCDMA(FDD2) RX : 1930 – 1990 MHz WCDMA(FDD8) TX : 880 – 915 MHz WCDMA(FDD8) RX : 925 – 960 MHz EGSM TX : 880 – 915 MHz EGSM RX : 925 – 960 MHz GSM850 TX : 824 – 849 MHz GSM850 RX : 869 – 894 MHz DCS1800 TX : 1710 – 1785 MHz DCS1800 RX : 1805 – 1880 MHz PCS1900 TX : 1850 – 1910 MHz PCS1900 RX : 1930 – 1990 MHz	
Application Standard		

2.3 Main Parts : GSM Solution

Item	Part Name	Comment
Digital Baseband	PMB9801 : Infineon	
Analog Baseband	PMB9801 : Infineon	One chip
RF Chip	PMB5703: Infineon	

2.4 HW Features

Item		Feature	Comment
Form Factor		DOP type	
Battery		1) Capacity Standard : Li-Ion Polymer, 1500mAh	
		2) Packing Type : Soft Pack	
Size		Standard :122 x 64 x 9.2mm	
Weight		109g	With Battery
Volume		TBD	
PCB		Any-layer type, 10 Layers , 0.65t	
Stand by time		2G Up to 375 hrs 3G Up to 375 hrs	@ Paging Period 9 (2G) @ DRX 7 (3G)
Charging time		3 hrs	@ Power Off / 1500mAh
Talk time		2G Up to 360 mins 3G Up to 360 mins	@ Tx=Max(2G) @ Tx = 12dBm (3G)
RX sensitivity		WCDMA(FDD1) : -106.7 dBm WCDMA(FDD2) : -106.7 dBm WCDMA(FDD8) : -106.7 dBm EGSM : -105 dBm GSM850 : -105 dBm DCS 1800 : -105 dBm PCS 1900 : -105 dBm	
TX output power	WCDMA/ GSM/ GPRS	WCDMA : 24dBm/3.84MHz,+1/-3dBm EGSM : 33dBm GSM850 : 33 dBm DCS 1800 : 30 dBm PCS 1900 : 30 dBm	Class3(WCDMA) Class4 (EGSM) Class4 (GSM850) Class1 (PCS) Class1 (DCS)
	EDGE	GSM 900 : 27 dBm DCS 1800 : 26 dBm PCS 1900 : 26 dBm	E2 (GSM900) E2 (PCS) E2 (DCS)
GPRS compatibility		GPRS Class 12	
EDGE compatibility		EDGE Class 12	
SIM card type		Plug-In SIM 2.85V /1.8V	

Display	Main LCD(WVGA) TFT Main LCD(4.0" 480 x 800)	
Built-in Camera	5M Primary CMOS Camera, 2M secondary camera	
Status Indicator	No	
Keypad	Function Key : 4 Side Key : 4	Function Key: Home,Back, menu,serach Side Key : Volume up,down, power key, Gesture
ANT	Main : LDS(Laser Direct Structure) type Sub : DPA type(Directed Print Antenna)	
System connector	5 Pin Micro USB	
Ear Phone Jack	3.5Phi, 4 Pole, Stereo	
PC synchronization	Yes	
Memory(AP)	eMMC : 2GB SDRAM : 4Gbit(POP)	
Speech coding	FR, EFR, HR, AMR	
Data & Fax	Built in Data & Fax support	
Vibrator	Built in Vibrator	
BlueTooth	V3.0	
MIDI(for Buzzer Function)	SW Decoded 72Poly	
Music Player	MP3/ WMA/AAC/HE-AAC/eAAC+	
Video Player	MPEG4, H.263, H.264, WMV9/VC-1, DiVX	
Camcorder	MPEG4, H.264, H.263	
Voice Recording	Yes	
Speaker Phone mode Support	Yes	
Travel Adapter	Yes	
CDROM	No	
Stereo Headset	Yes	
Data Cable	Yes	
T-Flash (External Memory)	Yes	Up to 32GB

2.5 SW Features

Item	Feature	Comment
RSSI	0 ~ 4 Levels	
Battery Charging	0 ~ 6 Levels	
Key Volume	0 ~ 7 Level	
Audio Volume	1 ~ 15 Level	
Time / Date Display	Yes	
Multi-Language	Yes	CZECH , DUTCH , FRENCH , GERMAN , GREEK , ITALIAN , PORTUGUESE , SPANISH , ARABIC , HEBREW , T CHINESE TW , S CHINESE , ROMANIAN , HUNGARIAN , SLOVAK , CROATIAN , BULGARIAN , MACEDONIAN , ICELANDIC
Quick Access Mode	Phone / Contacts / Messaging / Menu	
PC Sync	Yes	
Speed Dial	Yes	Voice mail center -> 1 key
Profile	Yes	not same with feature phone setting
CLIP / CLIR	Yes	
Phone Book	Name / Number / Email / Chat Id / Website / Postal addresses / Organizations / Groups / BirthdayNotes / Ringtone	There is no limitation on the number of items. It depends on available memory amount.
Last Dial Number	Yes	There is no limitation on the number of items. It depends on available memory amount.
Last Received Number	Yes	There is no limitation on the number of items. It depends on available memory amount.
Last Missed Number	Yes	There is no limitation on the number of items. It depends on available memory amount.

Search by Number / Name	Name / N	
Group	Yes	There is no limitation on the number of items. It depends on available memory amount.
Fixed Dial Number	Yes	
Service Dial Number	No	
Own Number	Yes	Read only (add/edit/delete are not supported)
Voice Memo	Yes	Support voice recorder
Call Reminder	Yes	Missed call popup
Network Selection	Automatic	
Mute	Yes	
Call Divert	Yes	
Call Barring	Yes	
Call Charge (AoC)	Yes	
Call Duration	Yes	
SMS (EMS)	There is no limitation on the number of items. It depends on available memory amount.	EMS does not support.
SMS Over GPRS	No	
EMS Melody / Picture Send / Receive / Save	No No	
MMS MPEG4 Send / Receive / Save	Yes Yes	
Long Message	MAX 459 characters	SMS 3pages
Cell Broadcast	Yes	
Download	Over the Web	
Game	Yes	
Calendar	Yes	

Memo	Yes	There is no limitation on the number of items. It depends on available memory amount.
World Clock	Yes	
Unit Convert	No	
Stop Watch	Yes	
Wall Paper	Yes	
WAP Browser	No	Support only web browser based on webkit. WAP stack and wml are not supported.
Download Melody / Wallpaper	Yes	Over web browser
SIM Lock	Yes	Operator Dependent
SIM Toolkit	Class 1, 2, 3, C, D	
MMS	Yes	
EONS	Yes	
CPHS	Yes	V4.2
ENS	No	
Camera	Yes	5M AF / Digital Zoom : x3
JAVA	No	Android do not support JAVA
Voice Dial	No	
IrDa	No	
Bluetooth	Yes	Ver. 3.0 (GAP, A2DP, AVRCP) DUN, FTP, GAVDP, GOEP, HFP, HSP, OPP, SDAP, SPP)
FM radio	Yes	
GPRS	Yes	Class 12
EDGE	Yes	Class 12
Hold / Retrieve	Yes	
Conference Call	Yes	Max. 6
DTMF	Yes	
Memo pad	No	

TTY	No	
AMR	Yes	
SyncML	Yes	
IM	Yes	Gtalk
Email	Yes	

2.6 HW SPEC.

1) GSM transceiver specification

Item	Specification
Phase Error	Rms : 5° Peak : 20 °
Frequency Error	GSM : 0.1 ppm DCS/PCS : 0.1 ppm
EMC(Radiated Spurious Emission Disturbance)	GSM/DCS : < -28dBm
Transmitter Output power and Burst Timing	GSM : 5dBm – 33dBm ± 3dB DCS/PCS : 0dBm – 30dBm ± 3dB
Burst Timing	<3.69us
Spectrum due to modulation out to less than 1800kHz offset	200kHz : -36dBm 600kHz : -51dBm/-56dBm
Spectrum due to modulation out to larger than 1800kHz offset to the edge of the transmit band	GSM : 1800-3000kHz :< -63dBc(-46dBm) 3000kHz-6000kHz : <-65dBc(-46dBm) 6000kHz < : < -71dBc(-46dBm) DCS : 1800-3000kHz :< -65dBc(-51dBm) 6000kHz < : < -73dBc(-51dBm)
Spectrum due to switching transient	400kHz : -19dBm/-22dBm(5/0), -23dBm 600kHz : -21dBm/-24dBm(5/0), -26dBm
Reference Sensitivity – TCH/FS	Class II(RBER) : -105dBm(2.439%)
Usable receiver input level range	0.012(-15 - -40dBm)
Intermodulation rejection – Speech channels	± 800kHz, ± 1600kHz : -98dBm/-96dBm (2.439%)
AM Suppression – GSM : -31dBm - DCS : -29dBm	-98dBm/-96dBm (2.439%)
Timing Advance	± 0.5T

2) WCDMA transmitter specification

Item	Specification
Transmit Frequency	BD1: 1920MHz ~ 1980 MHz BD2: 1850~1910 MHz BD8: 880 MHz ~ 915 MHz
Maximum Output Power	+24 dBm / 3.84 MHz, +1 / -3 dB
Frequency Error	within ±0.1 PPM
Open Loop Power Control	Normal Conditions : within ±9 dB, Extreme Conditions : within ±12 dB
Minimum Transmit Power	< -50 dBm /3.84 MHz
Occupied Bandwidth	< 5 MHz at 3.84 Mcps (99% of power)
Adjacent Channel Leakage Power Ratio (ACLR)	> 33 dB @ ±5 MHz, > 43 dB @ ±10 MHz
Spurious Emissions |f-fc| > 12.5 MHz	< -36 dBm / 1 kHz RW @ 9 kHz ≤ f < 150 kHz < -36 dBm / 10 kHz RW @ 150 KHz ≤ f < 30 MHz < -36 dBm / 100 kHz RW @ 30 MHz ≤ f < 1 GHz < -30 dBm / 1 MHz RW @ 1 GHz ≤ f < 12.75 GHz < -60 dBm / 3.84 MHz RW @ 869 MHz ≤ f ≤ 894 MHz < -60 dBm / 3.84 MHz RW @ 1930 MHz ≤ f ≤ 1900 MHz < -60 dBm / 3.84 MHz RW @ 2110 MHz ≤ f ≤ 2155 MHz < -67 dBm / 100 kHz RW @ 925 MHz ≤ f ≤ 935 MHz < -79 dBm / 100 kHz RW @ 935 MHz < f ≤ 960 GHz < -71 dBm / 100 kHz RW @ 1805 MHz ≤ f ≤ 1880 MHz < -41 dBm / 300 kHz RW @ 1884.5 MHz < f < 1919.6 MHz
Transmit Intermodulation	< -31 dBc @ 5 MHz & < -41 dBc @ 10 MHz when Interference CW Signal Level = -40 dBc
Error Vector Magnitude	< 17.5 %, when Pout ≥ -20 dBm
Peak Code Domain Error	< -15 dB at Pout ≥ -20 dBm

3) WCDMA receiver specification

Item	Specification
Receive Frequency	BD1: 2110 MHz ~2170 MHz BD2: 1850~1910 MHz BD8: 925 MHz ~ 960 MHz
Reference Sensitivity Level	Band1 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz Band2 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz Band8 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz
Maximum Input Level	BER < 0.001 when Îor = -25 dBm / 3.84 MHz
Adjacent Channel Selectivity (ACS)	ACS > 33 dB where BER < 0.001 when Îor = -92.7 dBm / 3.84 MHz & Ioac = –52 dBm / 3.84 MHz @ ±5 MHz
Blocking Characteristic	BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz & Iblocking = -56 dBm / 3.84 MHz @ Fuw(offset) = ±10 MHz or Iblocking = -44 dBm / 3.84 MHz @ Fuw(offset) = ±15 MHz
Spurious Response	BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz & Iblocking = -44 dBm
Intermodulation	BER < 0.001 when Îor= -103.7 dBm / 3.84 MHz & Iouw1 = -46 dBm @ Fuw1(offset) = ±10 MHz & Iouw2 = -46 dBm / 3.84 MHz @ Fuw2(offset) = ±20 MHz
Spurious Emissions	< -57 dBm / 100 kHz BW @ 9 kHz ≤ f < 1 GHz < -47 dBm / 1 MHz BW @ 1 GHz ≤ f ≤ 12.75 GHz
Inner Loop Power Control In Uplink	Adjust output(TPC command) cmd 1dB 2dB 3dB +1 +0.5/1.5 +1/3 +1.5/4 0 -0.5/+0.5 -0.5/+0.5 -0.5/+0.5 -1 -0.5/-1.5 -1/-3 -1.5/-4 group(10equal command group) +1 +8/+12 +16/+24

4) HSDPA transmitter specification

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Transmit Frequency</td><td>BD1: 1920MHz ~ 1980 MHz
BD2: 1850~1910 MHz
BD8: 880 MHz ~ 915 MHz</td></tr>
<tr><td>Maximum Output Power</td><td>Sub-Test
1=1/15, 2=12/15 21~25dBm / 3.84 MHz
3=13/15 4=15/8 20~25dBm / 3.84 MHz
5=15/7 6=15/0 19~25dBm / 3.84 MHz</td></tr>
<tr><td>HS-DPCCH</td><td>
<table>
<tr><th>Sub-test in table C.10.1.4</th><th>Power step</th><th>Power step slot boundary</th><th>Power step size, P [dB]</th><th>Transmitter power step tolerance [dB]</th></tr>
<tr><td rowspan="4">5</td><td>1</td><td>Start of Ack/Nack</td><td>6</td><td>+/- 2.3</td></tr>
<tr><td>2</td><td>Start of CQI</td><td>1</td><td>+/- 0.6</td></tr>
<tr><td>3</td><td>Middle of CQI</td><td>0</td><td>+/- 0.6</td></tr>
<tr><td>4</td><td>End of CQI</td><td>5</td><td>+/- 2.3</td></tr>
</table>
</td></tr>
<tr><td>Spectrum Emission Mask</td><td>Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0
<table>
<tr><th>Frequency offset from carrier △f</th><th>Minimum requirement</th><th>Measurement Bandwidth</th></tr>
<tr><td>2.5 ~ 3.5 MHz</td><td>-35-15×(△f-2.5)dBc</td><td>30 kHz</td></tr>
<tr><td>3.5 ~ 7.5 MHz</td><td>-35-1×(△f-3.5)dBc</td><td>1 MHz</td></tr>
<tr><td>7.5 ~ 8.5 MHz</td><td>-35-10×(△f-7.5)dBc</td><td>1 MHz</td></tr>
<tr><td>8.5 ~ 12.5 MHz</td><td>-49dBc</td><td>1 MHz</td></tr>
</table>
</td></tr>
<tr><td>Adjacent Channel Leakage Power Ratio (ACLR)</td><td>Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0
> 33 dB @ ±5 MHz
> 43 dB @ ±10 MHz</td></tr>
<tr><td>Error Vector Magnitude</td><td>< 17.5 %, when Pout ≥ -20 dBm</td></tr>
</table>

5) HSDPA receiver specification

Item	Specification
Receive Frequency	BD1: 2110 MHz ~2170 MHz BD2: 1850~1910 MHz BD8: 925 MHz ~ 960 MHz
Maximum Input Level (BLER or R), 16QAM Only	Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0 BLER < 10% or R >= 700kbps

6) HSUPA Tx, Rx specification

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Maximum Output Power</td><td>Sub-Test
1=11/15 21~24dBm / 3.84 MHz
2=6/15 19~22dBm / 3.84 MHz
3=15/9 20~23dBm / 3.84 MHz
4=2/15 20~25dBm / 3.84 MHz
5=15/15 19~25dBm / 3.84 MHz</td></tr>
<tr><td>Spectrum Emission Mask</td><td>Sub-Test : 1=11/15, 2=6/15, 3=15/9, 4=2/15, 5=15/15
<table>
<tr><td>Frequency offset from carrier △f</td><td>Minimum requirement</td><td>Measurement Bandwidth</td></tr>
<tr><td>2.5 ~ 3.5 MHz</td><td>-35-15×(△f-2.5)dBc</td><td>30 kHz</td></tr>
<tr><td>3.5 ~ 7.5 MHz</td><td>-35-1×(△f-3.5)dBc</td><td>1 MHz</td></tr>
<tr><td>7.5 ~ 8.5 MHz</td><td>-35-10×(△f-7.5)dBc</td><td>1 MHz</td></tr>
<tr><td>8.5 ~ 12.5 MHz</td><td>-49dBc</td><td>1 MHz</td></tr>
</table></td></tr>
<tr><td>Adjacent Channel Leakage Power Ratio (ACLR)</td><td>Sub-Test : 1=11/15, 2=6/15, 3=15/9, 4=2/15, 5=15/15
> 33 dB @ ±5 MHz
> 43 dB @ ±10 MHz</td></tr>
</table>

6) WLAN 802.11b transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -30 @ fc-22MHz< f <fc-11MHz and fc+11MHz< f <fc+22MHz ≤ -50 @ f < fc-22MHz and f > fc+22MHz
Power ramp on/off time	≤ 2us
Carrier Suppression	≤ -15dB
Modulation Accuracy (Peak EVM)	≤ 35%
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	≤ -76dBm(1Mbps,2Mbps,5.5Mbps,11Mbps) @ FER ≤ 8%
Rx Max input Sensitivity	≥ -10dBm(1Mbps,2Mbps,5.5Mbps,11Mbps) @ FER ≤ 8%
Rx Adjacent Channel Rejection	≥ 35dB @FER ≤ 8%, interference input signal -70dBm@fc±25MHz(11Mbps)

7) WLAN 802.11g transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -20 @ ±11MHz offset (9Mhz ~ 11MHz) ≤ -28 @ ±20MHz offset (11MHz ~ 20Mhz) ≤ -40 @ ±30MHz offset (20MHz ~ 30Mhz)
Transmitter constellation error (rms EVM)	≤ -5dB@6Mbps, ≤ -8dB@9Mbps, ≤ -10dB@12Mbps, ≤ -13dB@18Mbps, ≤ -16dB@24Mbps, ≤ -19dB@36Mbps, ≤ -22dB@48Mbps, ≤ -25dB@54Mbps
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	PER ≤ 10% -82dBm@6Mbps, -81dBm@9Mbps, -79dBm@12Mbps -77dBm@18Mbps, -74dBm@24Mbps, -70dBm@36Mbps -66dBm@48Mbps, -65dBm@54Mbps
Rx Max input Sensitivity	≥ -20dBm(6,9,12,18,24,36,48,54Mbps) @ PER ≤ 10%
Rx Adjacent Channel Rejection	PER ≤ 10%, ACR ≥ 16dB@6Mbps, ACR ≥ 15dB@9Mbps, ACR ≥ 13dB@12Mbps, ACR ≥ 11dB@18Mbps, ACR ≥ 8dB@24Mbps, ACR ≥ 4dB@36Mbps ACR ≥ 0dB@48Mbps, ACR ≥ -1dB@54Mbps ※ ACR shall be measured by setting the desired signal's strength 3 dB above the rate-dependent sensitivity specified in min input sensitivity

8) WLAN 802.11n transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -20 @ ±11MHz offset (9Mhz ~ 11MHz) ≤ -28 @ ±20MHz offset (11MHz ~ 20Mhz) ≤ -45 @ ±30MHz offset (20MHz ~ 30Mhz)
Transmitter constellation error (rms EVM)	≤ -5dB@6.5Mbps, ≤ -10dB@13Mbps, ≤ -13dB@19.5Mbps, ≤ -16dB@26Mbps, ≤ -19dB@39Mbps, ≤ -22dB@52Mbps, ≤ -25dB@58.5Mbps, ≤ -28dB@65Mbps
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	PER ≤ 10% -82dBm@6.5Mbps, -79dBm@13Mbps, -77dBm@19.5Mbps -74dBm@26Mbps, -70dBm@39Mbps, -66dBm@52Mbps -65dBm@58.5Mbps, -64dBm@65Mbps
Rx Max input Sensitivity	≥ -20dBm(6.5,13,19.5,26,39,52,58.5,65Mbps) @ PER ≤ 10%
Rx Adjacent Channel Rejection	PER ≤ 10%, ACR ≥ 16dB@6.5Mbps, ACR ≥ 13dB@13Mbps, ACR ≥ 11dB@19.5Mbps, ACR ≥ 8dB@26Mbps, ACR ≥ 4dB@39Mbps, ACR ≥ 0dB@52Mbps ACR ≥ -1dB@58.5Mbps, ACR ≥ -2dB@65Mbps ※ ACR shall be measured by setting the desired signal's strength 3 dB above the rate-dependent sensitivity specified in min input sensitivity

9) GPS receiver specification

Item	Specification
Receive Frequency	1574.42 MHz ~ 1576.42 MHz
Minimum Sensitivity	1 satellite ≥-142dBm, 7 satellites ≥ -147dBm at coarse time aiding

10) Current consumption

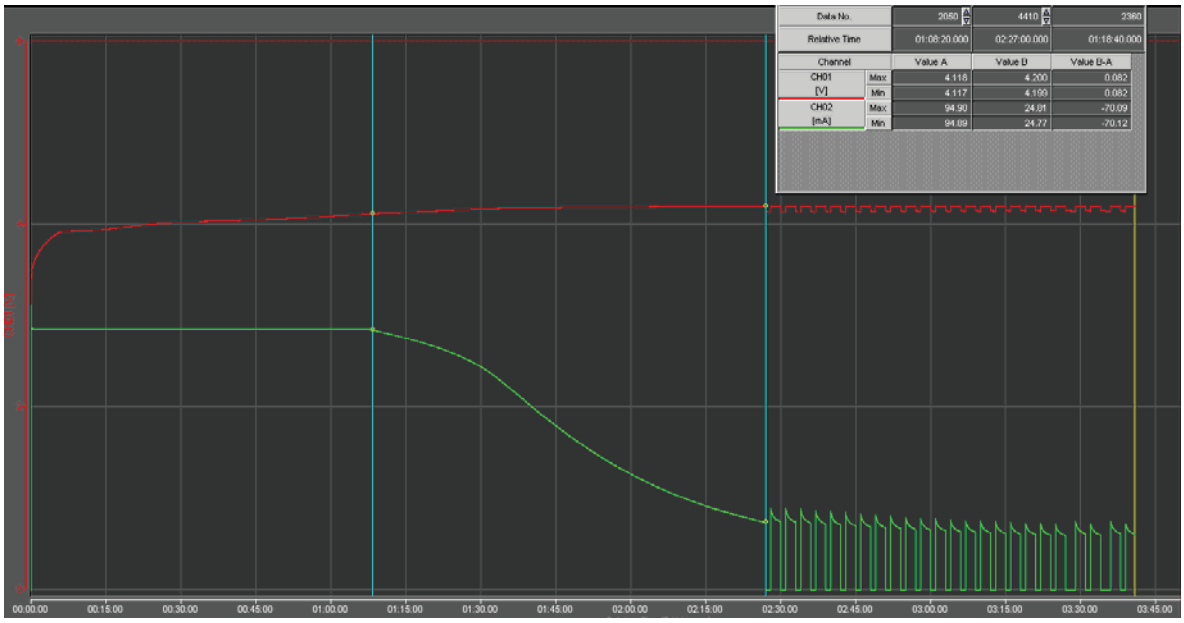
	Stand by		Voice Call	VT
	Bluetooth Off	Bluetooth Connected		
WCDMA Only	4.0 mA under (DRX=1.28)	7 mA under (DRX=1.28)	350 mA under (Tx=12dBm)	NA
GSM Only	4.0 mA under (Paging=5 period)	7 mA under (Paging=5 period)	350 mA under (Tx=Max)	

11) Battery life time

	Stand by	Voice Call	VT
WCDMA	350 hours over (DRX = 1.28)	250 min over (TX = 12dBm, Low Pwr mode)	NA
GSM	350 hours over (Paging Period = 9)	250 min over (TX Level = Max)	

12) Charging hour

3.5hour under (1500mAh battery, 1A TA)



13) RSSI indicator (Based on Cell power)

BAR	WCDMA	GSM/DCS/PCS
4	Over -90±2dBm	Over -90 ±2dBm
4◊3	-90 ±2dBm	-90 ±2dBm
3◊2	-96 ±2dBm	-97 ±2dBm
2◊1	-102 ±2dBm	-103 ±2dBm
1◊0	-110 ±2dBm	-107 ±2dBm

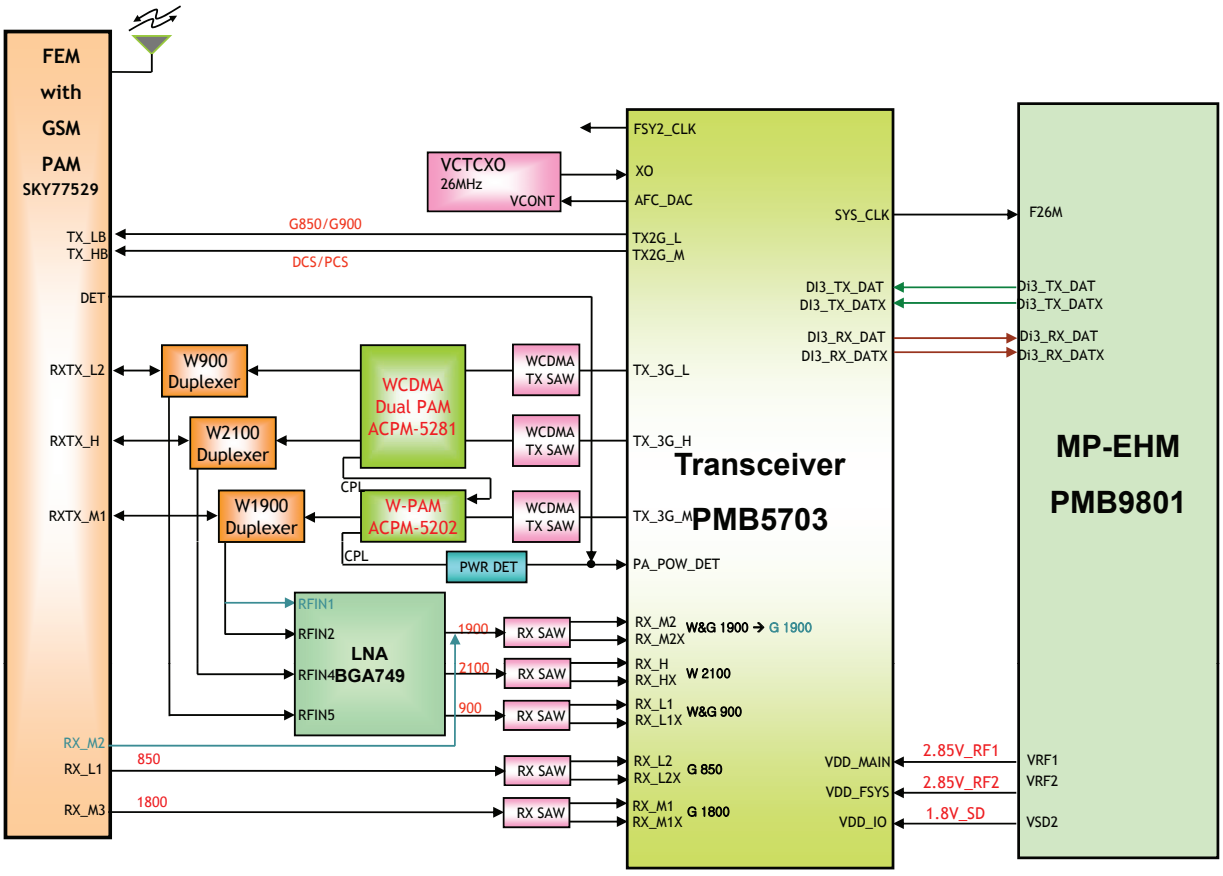
14) Battery indicator

Battery Bar	Specification	
BAR 6 (Full)	90% over	remain%
BAR 6 --> 5	90% ◊ 89%	
BAR 5 --> 4	70% ◊ 69%	
BAR 4 --> 3	50% ◊ 49%	
BAR 3 --> 2	30% ◊ 29%	
BAR 2 --> 1	15% ◊ 14%	
BAR 1 --> 0	5% ◊ 4%	
Low Battery Pop-up	4% ~ 15% : One Time popup (No call)	
Critical Low Battery Pop-up	0% ~ 3% : Every Level change popup (No call)	
POWER OFF	0%	

3. TECHNICAL BRIEF

3.1 GENERAL DESCRIPTION

The LG-P970 supports UMTS-900, UMTS-1900, UMTS-2100, GSM-850, GSM-850, GSM-900, GSM-1800, and GSM-1900 based GSM/GPRS/EDGE/UMTS. All receivers and the UMTS transmitter use the radioOne1Zero-IF architecture to eliminate intermediate frequencies, directly converting signals between RF and baseband. The quad-band GSM transmitters use a baseband-to-IF upconversion followed by an offset phase-locked loop that translates the GMSK-modulated or 8-PSK-modulated signal to RF.



[Figure 3-1] Block diagram of RF part

General

SMARTi™ UE is a highly integrated UMTS/GSM-transceiver, with all necessary features to enable multi mode,multi band telephone applications. It incorporates a fully integrated dual mode receiver, multi band TX outputs,TCVCXO control, a measurement interface, DigRF V3.09 compliant high speed data and control interface, a multi mode timer unit and all necessary front end signals for the complete RF Engine control. Overall the IC directly supports RF engines with up to 4 GSM bands and typ. 3 UMTS (can be less or more depending on engine setup) bands without additional discrete RF path switches.

Receiver Section

For the RX section the IC features 5 RX inputs, 4 of those might be used for multi mode receive, this means they can be used for GSM and UMTS (the IC can be reconfigured to achieve in spec performance) operation. The band I input is for UMTS operation only. The multi mode inputs may alternatively be configured to be first LNA (for GSM) or LNA2 (UMTS) when an additional external LNA and interstage filter is used. The receiver structure is optimized for compressed mode operation, thus only a single base band chain is used, saving area and optimizes power consumption.The receiver AGC can be aligned to the UMTS frame structure with the TAS macro SYNC3G.

Transmitter Section

The TX features 6 RF outputs, which are directly matched to 50 Ω impedance for easy connection to external power amplifiers, which reduces significantly external component count. 2 outputs are high power, small signal polar modulated outputs for the GSM system, with low sensitivity to PA harmonics. They are capable to perform GMSK or 8-PSK modulation signals with excellent noise performance, thus no interstage filter in between transceiver and PA is required. The low band output covers the 850 and the 900 MHz GSM bands, the mid band output covers the 1800 and 1900 MHz bands.

The UMTS outputs are vector modulated single ended high output power driver amplifiers, with excellent EVM and adjacent channel leakage performance. Together with external UMTS power amplifier modules all bands except band VII can be addressed. There is one driver for all low bands (850 and 900 MHz bands), two drivers for the mid bands (1700 - 1900 MHz bands) and one driver for the high band (2100 MHz band). Thus many band combinations can be supported by the transceiver.

The IC features additionally closed loop power control for GSM and for UMTS, thus supporting TRP requirements in cooperation with the power amplifier and the antenna design. There is one input pin for the power detector voltage coming from the PA, the complete loop circuits are implemented in the digital domain, which enables a high reliability of the loop performance for both standards.

Interfaces

The base band is connected via a DigRF V3.09 high speed data interface with a maximum clock frequency of 312 MHz. The pure digital interface enables the digital baseband to shrink efficiently, as all the analog functionality is within the RFIC. All data and control traffic is multiplexed via the RX and TX interface lines. The IC features a high level programming model enabling the complete compressed mode operation of the device in an RF engine environment.It handles RX and TX power control, also incorporating the calibration data. The complete timing is optimized for compressed mode operation of the transceiver, it controls the front end components of the engine (PA´s, switches, LNA´s). Additionally a SPI control bus for front end component control is available in the IC, which also enables the readback of data from external components, thus the handling of functions like PA saturation, mismatch detection, overheating (incorporated in the closed loop power control) can be adopted.

AFC Control

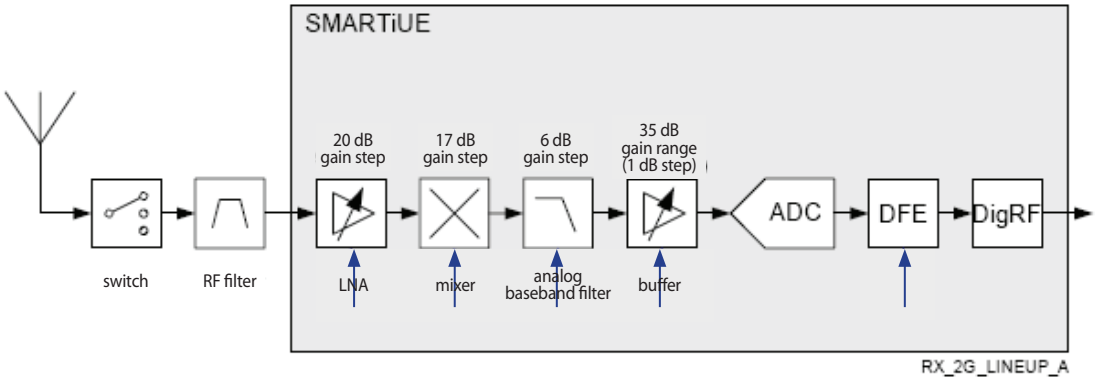
The AFC control is maintained by providing a voltage generated by a 12-Bit DAC to the external TCVCXO module, which means the reference clock is synchronized to the system frequency.

3.2 GSM MODE

3.2.1 GSM RECEIVER

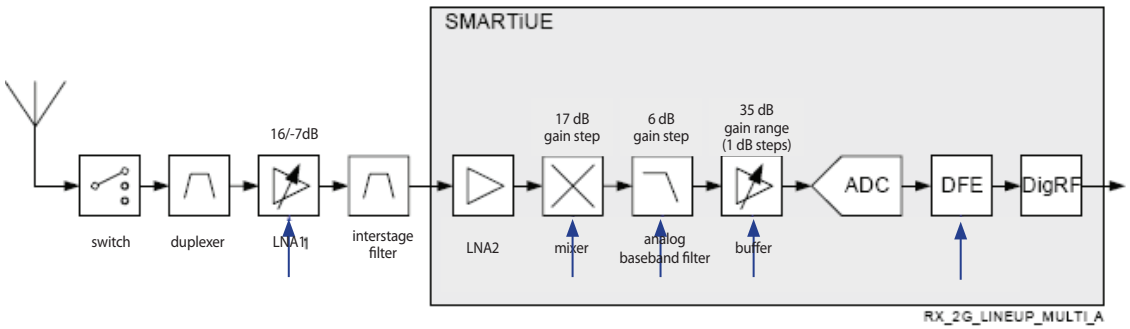
The GSM-850/GSM-1800, receiver inputs of PMB5703 are connected directly to the transceiver front-end Module. The GSM-900/GSM-1900 receiver inputs are using the Rx path with WCDMA1900 and WCDMA900 bands. The GSM-850, GSM-900, GSM-1800, and GSM-1900 receiver inputs use differential configurations to improve common-mode rejection and second-order non-linearity performance.

Figure 3-2 shows the line-up for the 2G receiver chain for bands serving only GSM. The RX digital front-end (DFE) contains all digital signal processing. Blue arrows show gain switching inputs of the signal processing stages. The signal path splits at the mixer input into an in-phase and an identical quadrature path. For simplicity the 2nd path is not shown in the figure. The quadrature downconverter translates the useful signal directly to baseband (zero-IF).



[Figure 3-2] 2G Receiver Line Up-GSM Single Mode Setup

Figure3-3 shows the 2G receiver line-up in a multimode band. Note the gain step given for the external LNA may vary from the given value. The chain is basically identical to the 3G line-up but many stages in analog and digital domain are switched into a different operation mode.



[Figure 3-3] 2G Receiver Line Up-GSM Multi Mode Setup

Since GSM-850, GSM-900, GSM-1800, and GSM-1900 signals are time-division duplex (the handset can only receive or transmit at one time), switches are used to separate Rx and Tx signals in place of frequency duplexers – this is accomplished in the switch module. The GSM-850, GSM-900, GSM-1800, and GSM-1900 receive signals are routed to the PMB5703 through band selection filters and matching networks that transform single-ended 50-Ω sources to differential impedances optimized for gain and noise figure. The PMB5703 input uses a differential configuration to improve second-order intermodulation and common mode rejection performance.

The downconverted baseband outputs are multiplexed and routed to lowpass filters (one I and one Q) having passband and stopband characteristics suitable for GMSK or 8-PSK processing. These filter circuits include DC offset corrections.

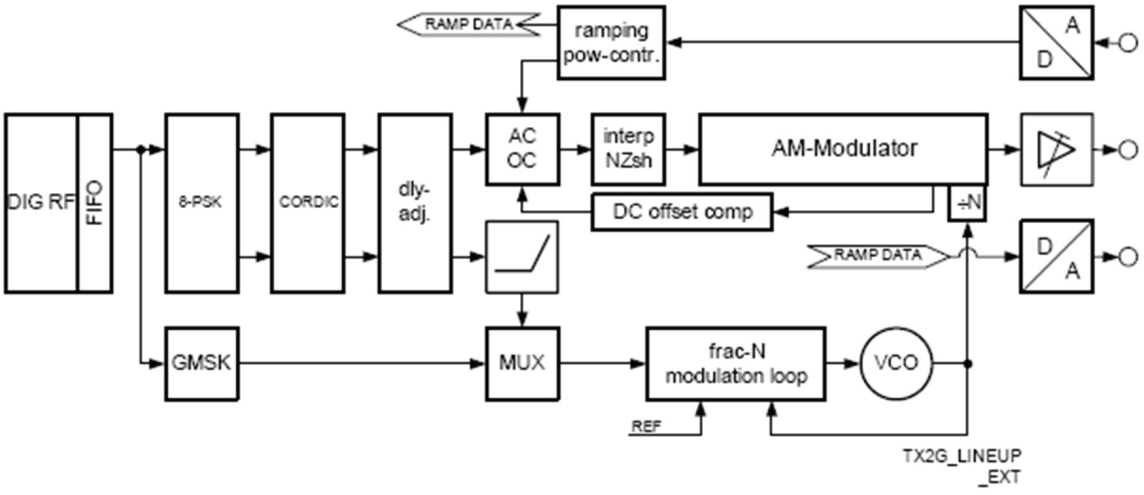
3.2.2 GSM TRANSMITTER

The transmitter takes the modulating symbols sent from baseband via DigRF Interface and converts them into a RF signal. It is based on a polar modulator architecture where amplitude and phase (or alternatively frequency) are first handled separately and afterwards are merged in the RF domain.

The signal flow can be understood when you look at Figure 3-4. The digital symbol stream enters either a 8PSK or a GMSK modulator, depending on the desired mode. The GMSK signal is thereby differentially encoded as postulated by GSM specification 45.004. If a generator runs out of symbols, it behaves as if an input series of repeating dummy symbols has been applied. To simplify mode switching between 8PSK and GMSK, the two generators are synchronized. In 8PSK mode, the output of the internal 8PSK signal generator is given in Cartesian (I/Q) coordinates. The desired conversion into polar coordinates (amplitude and phase) is executed by a CORDIC algorithm. For GMSK mode the CORDIC algorithm is not involved - the incoming GMSK symbols directly determine the modulation frequency of the sigma-delta modulation loop.

In the phase path the phase signal is differentiated to obtain a frequency signal, which is fed into a preemphasis filter to compensate for narrow PLL bandwidth. Afterwards it is applied to the Sigma-Delta modulation loop. In this way the Sigma-Delta PLL shifts the phase information into RF domain.

The digital amplitude signal is multiplied with the ramping waveform, converted into an analog voltage and filtered. After that it is mixed with the purely phase modulated RF carrier to gain an amplitude and phase modulated output signal. The output power can be influenced directly by a PGA (programmable gain amplifier), if no power control loop is needed, or by specifying a target output level, if a closed power loop for enhanced output power accuracyis desired.

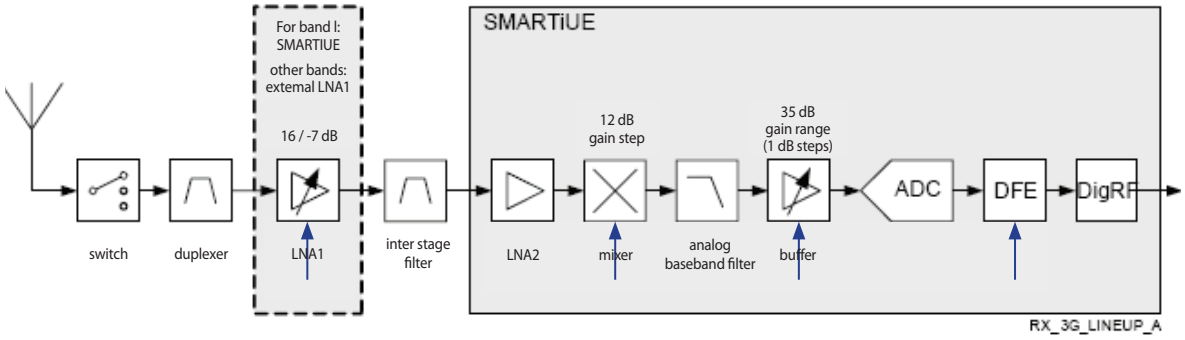


[Figure 3-4] 2G Transmitter Line Up

3.3 UMTS MODE

3.3.1 UMTS RECEIVER

Figure 3-5 shows the line-up for the 3G receiver chain. Note that the high gain / low gain figures for external LNA1 are given as an example. The blue arrows indicate the gain control inputs for the AGC subsystem. The quadrature path is a simple copy of the chain from mixer to DigRF and is not shown in the diagram.



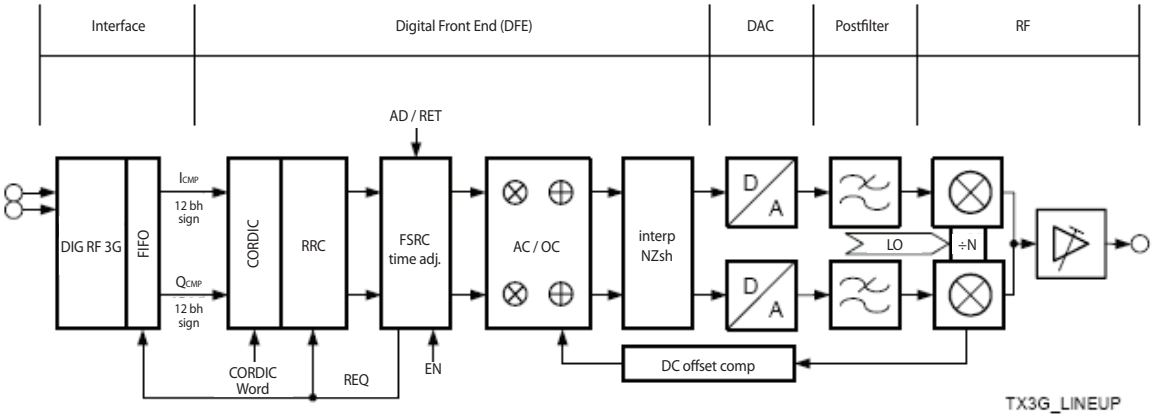
[Figure 3-5] 3G Receiver Line Up

After quadrature downconversion to baseband(Zero-IF) the signal is fed to the analog baseband filter.
The range and gain step of the following buffer amplifier is actually determined by the needs of the AGC in 3G mode.

3.3.2 UMTS TRANSMITTER

Figure 3-6 shows a functional overview of the 3G transmitter chain implemented for RF signal processing. The IQ-chips, which are transferred via the digital interface, are stored in a FIFO. Then it depends on the setting of three signals how samples are consumed from the FIFO Buffer.

Then the samples are fed into a CORDIC, which is used to shift the phase of the complex signal. The root-raisedcosine (RRC) filter performs the pulse shaping according to 3GPP. As the system clock is no integer multiple of the UMTS chip rate a fractional sample rate conversion (FSRC) is necessary. In the amplitude correction / offset correction (AC/OC) block the amplitude and the offset of the IQ-signal are modified.
The final sample rate at the output of the digital front end is achieved in the interpolation / noise shaping block, where also the word length is reduced in order to fit to the D/A-converter resolution. After the DAC a post-filter reduces the level of the repetition spectrum and the analog noise in order to supply a clean signal to the IQ-modulator. The frequency conversion to the wanted TX-channel is done in a direct-up conversion IQ-modulator which is followed by a gain stage with a single ended high power output.



[Figure 3-6] 3G Transmitter Line Up

3.4 GPS RECEIVER

The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. The GPS Receiver of P970 built-in BCM4751 is A-GPS chipset is made by BROADCOM that uses a host based integration architecture that splits processing functions between the GPS core and the CPU on the Host system. The Broadcom BCM4751 is a single-chip GPS receiver used for tracking and navigation, primarily in mobile devices. It's massively parallel, hardware correlator architecture provides signal searches, accurate real-time navigation, improved tracking sensitivity and low average power consumption.

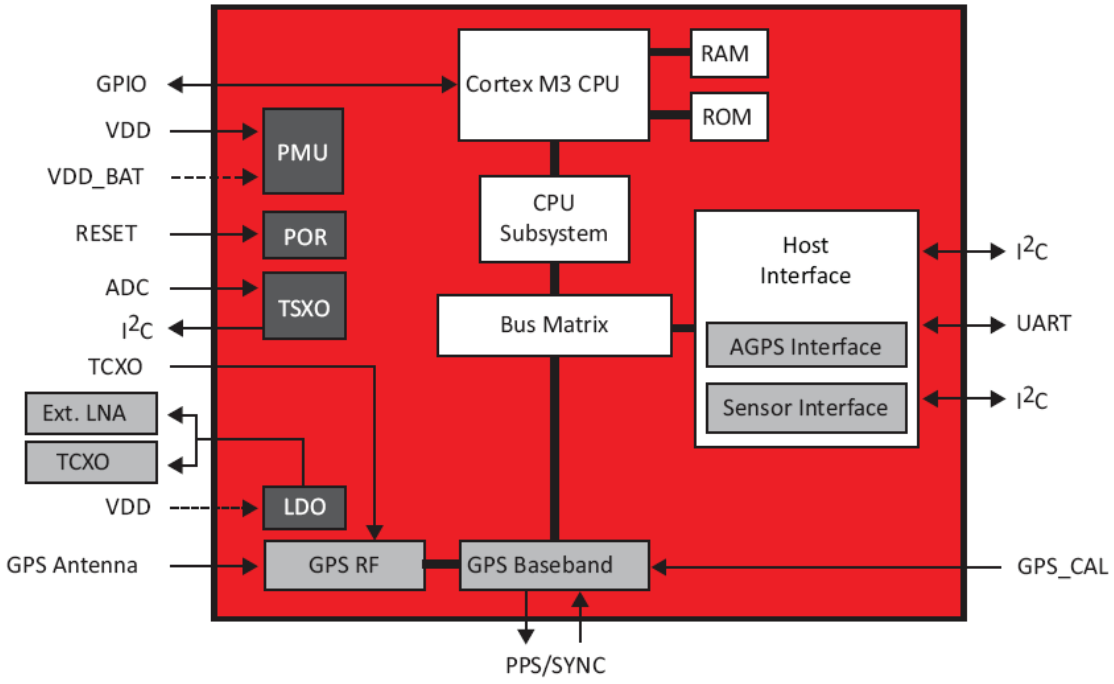


Fig3.7. Block diagram of BCM4751

The BCM4751 supports additional satellite constellations including the Satellite Based Augmentation System (SBAS) and the Quasi-Zenith Satellite System (QZSS) for Japanese applications, making as many as twelve additional satellites available for use in navigation.

The BCM4751 GPS receiver offers 65nm CMOS design featuring a highly-integrated RF and baseband processor with extremely low power consumption. It also claims smallest complete PCB footprint at 30mm^2 including band-pass filter, TCXO and passives.

BCM4751 GPS receiver includes software that meets international standards bodies such as 3GPP, GERAN and OMA, which promote the delivery of GPS assistance data over cellular networks. Figure shows block diagram of BCM4751.

The GPS signal is received by the antenna and amplified by an internal LNA. The differential signal coming out of the LNA is sent to an I/Q mixer, which uses a local Oscillator to directly down-convert the signal to an IF Near 6MHz.

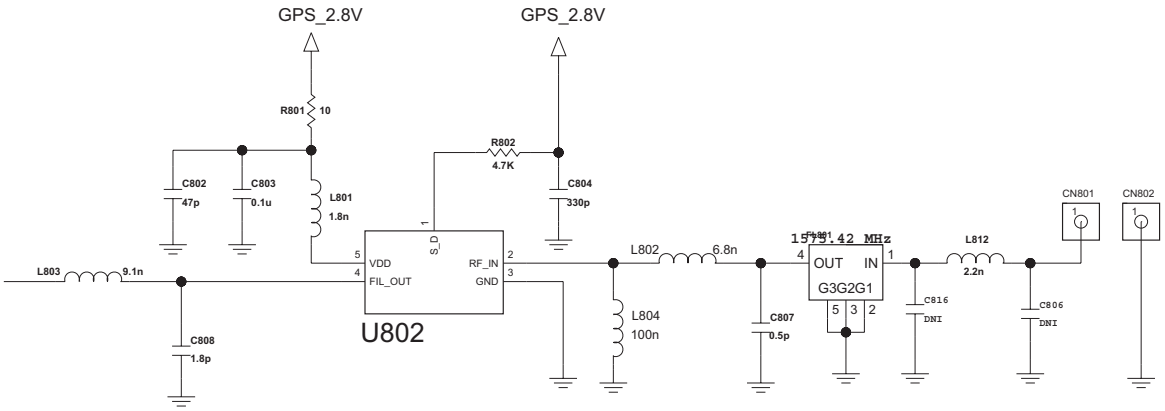


Fig3.8. The Schematic of GPS RF path circuit of P970

Figure shows the schematic of GPS RF path circuit of P970, The CN801has connected GPS antenna, GPS signal is routed from connector (CN801) and antenna, through a dielectric band pass filter (FL801) and then is amplified by The GPS LNA module(U802).

The GPS LNA module combines low noise amplifier with filter. The LNA module has RF character, that is 18.2dB gain and 0.95dB noise figure and rejected spurious signal.

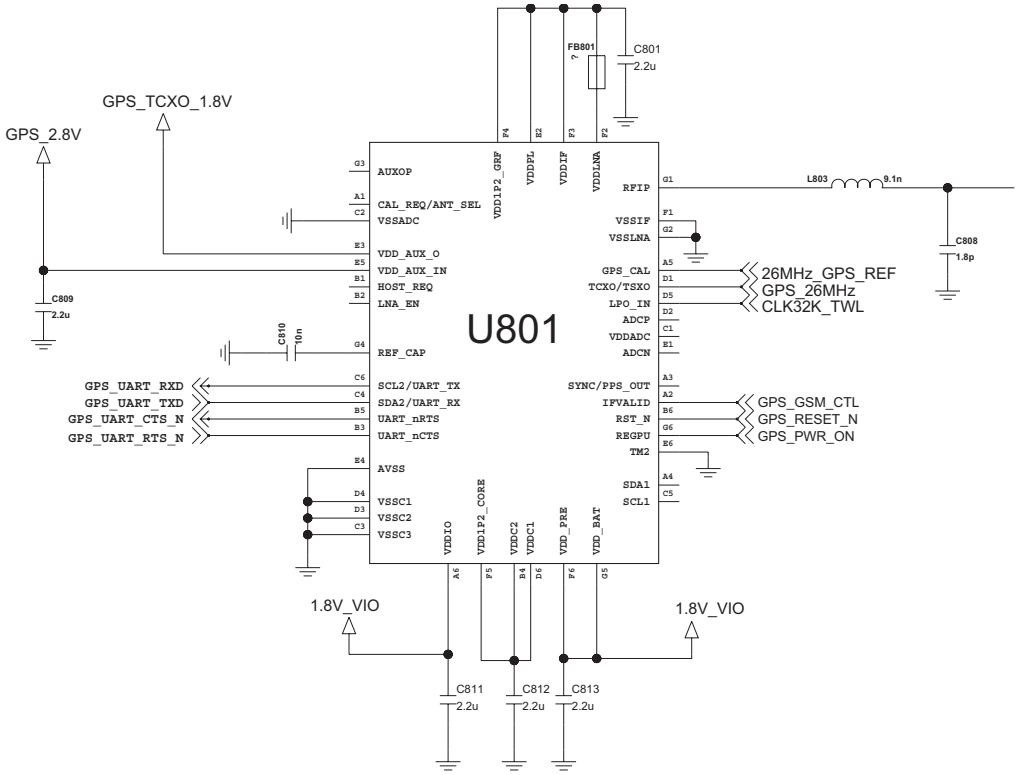
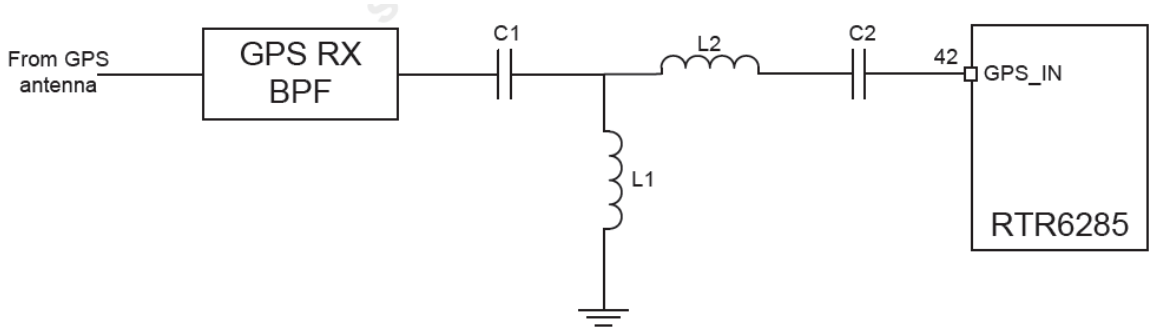


Fig3.9. The Schematic of GPS main circuit of P970

The amplified GPS signal due to GPS LNA module, go into RFIP pin of U801 GPS chipset. Figure. shows the schematic of GPS main circuit of P970. The internal LNA/mixer in U801 down-converts the 1575.42MHz GPS signal to an intermediate frequency of approximately 6.2 MHz. Setting the IF at around 6MHz reduces the sensitivity of the GPS RF to flicker noise and DC offset.

The TCXO (X801) makes 26MHz reference clock that drives the frequency synthesizer into U801 that generates about 1.5GHz LO signal. The frequency synthesizer conations a fraction-N PLL consisting of on-chip VCO and supports a wide rage of reference frequencies, including all frequencies commonly specified in mobile phone standards.

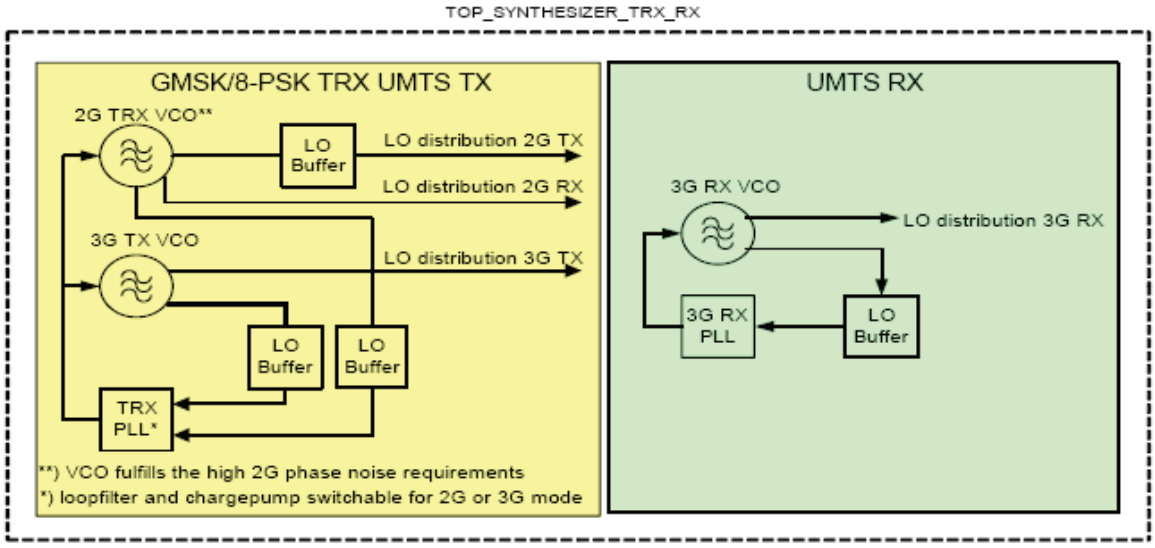
The GPS receiver input employs a single-ended connection realized by this pin. The GPS input is routed from the GPS antenna switch, through a band pass filter and then an impedance transformer circuit that optimally matches the impedance looking into the GPS LNA. The impedance transformer circuit topology is shown in Figure 3.10.



[Figure 3.10] GPS Input Network Topology

3.5 LO GENERATION and DISTRIBUTION CIRCUIT

The PMB 5703 contains two synthesizer blocks (see Figure3-6). Depending on UMTS or GMSK/8-PSK mode different VCOs, LF and CPs settings are used. In GMSK/8-PSK mode only the TRX PLL loop with the 2G TRX VCO is working, which is available in the TX synthesizer block (left). In UMTS TX/RX mode, two separate synthesizer blocks are available. The TX synthesizer is in the UMTS TX block (left), where the loop is working with the 3G TX VCO. The RX synthesizer is in UMTS RX block working with the 3G RX VCO.



[Figure 3-6] RF Synthesizer (GMSK/8-PSK and UMTS)

In the PMB 5703 the receiver and the transmitter contain each a complete fractional-N sigma-delta synthesizer with fast locking. For GMSK/8-PSK RX operation mode a fractional-N sigma-delta synthesizer for the frequency synthesis is used. For GMSK/8-PSK TX operation mode the fractional-N sigma-delta synthesizer is used as a Sigma-Delta modulation loop to process the phase/frequency signal.
A 26 MHz reference signal (provided by an internal clock generation block) serves as comparison frequency of the phase detector. In GMSK/8-PSK mode the divider in the feedback path of the synthesizer is carried out as a multi-modulus divider (MMD). The GMSK/8-PSK loop filter is fully integrated and the loop bandwidth is about 100 kHz to allow the transfer of the phase modulation during GMSK/8-PSK operation. The open loop gain is automatically adjusted prior to each GMSK/8-PSK slot . To overcome the statistical spread of the loopfilter element values an automatic loopfilter adjustment is performed before each GMSK/8-PSK synthesizer startup.

The fully integrated GMSK/8-PSK quad-band VCO is designed for the four GMSK/8-PSK bands (850, 900, 1800,1900 MHz) and operates at double (for GSM1800 and GSM1900 band) or four times (for GSM850 and GSM900 band) of the transmit or receive frequency. To cover the wide frequency range the VCO is automatically aligned by a binary automatic band selection before the settling process of the synthesizer starts. In UMTS TX and RX mode a fractional-N sigma-delta synthesizer for the frequency synthesis is used.
The implemented divider in the feedback path of the synthesizer is carried out as a multi-modulus divider (MMD). Also the 26 MHz reference signal serves as comparison frequency of the phase detector. The UMTS loop filter is fully integrated and the loop bandwidth is about 180 kHz. The open loop gain is automatically adjusted prior each UMTS channel programming.

The two fully integrated UMTS VCOs are designed for the UMTS bands (I, II, III, IV, V, VI, VIII, IX and X) and operates at double (for bands I, II, III, IV, IX and X) or four times (for bands V, VI and VIII) of the transmit or receive frequency. To cover the wide frequency range the VCOs are automatically aligned by a binary automatic band selection before the settling process of the synthesizer starts.

3.6 OFF-CHIP RF COMPONENTS

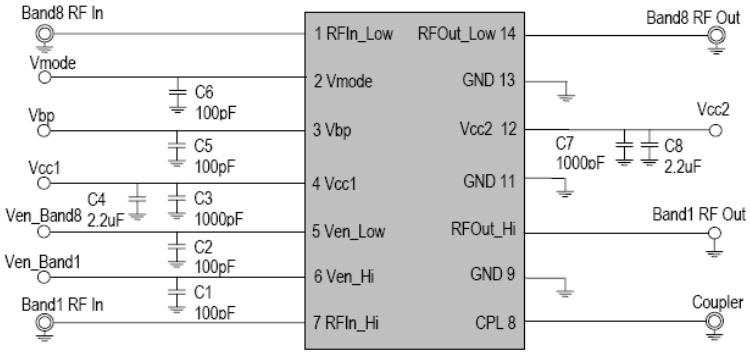
3.6.1 UMTS PAM

3.6.1.1 W2100,W900 (U105, ACPM-5281), W1900(U103, ACPM-5202)

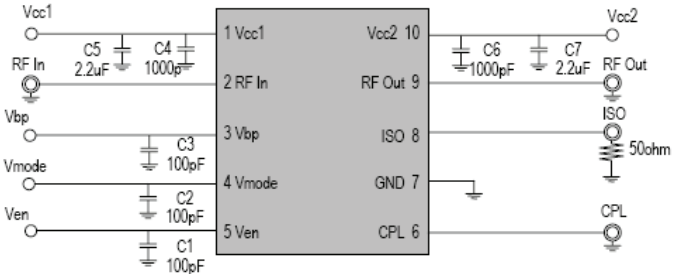
The ACPM-5281 is a dual-band PAM (Power Amplifier Module) designed for UMTS Band1 and Band8. The ACPM-5281 meets stringent UMTS linearity requirements. The 4mmx5mm form factor 14-pin surface mount package is self contained, incorporating 50ohm input and output matching networks.

The ACPM-5202 is a fully matched 10-pin surface mount module developed for UMTS Band2. This power amplifier module operates in the 1850-1910MHz bandwidth. The ACPM-5202 meets stringent UMTS linearity requirements up to 28dBm output power (Rel99). The 3mmx3mm form factor package is self contained, incorporating 50ohm input and output matching networks

The ACPM-5281 and ACPM-5202 feature 5th generation of CoolPAM circuit technology which supports 3 modes – bypass, mid and high power modes. The CoolPAM is stage bypass technology which enables power amplifier to lower power consumption. Active bypass feature is added to 5th generation to enhance power added efficiency at low output range and this technology extends talk time of mobiles more by further saving power amplifier's current consumption. The power amplifier is manufactured on an advanced InGaP HBT (hetero-junction Bipolar Transistor) MMIC (microwave monolithic integrated circuit) technology offering state-of-the-art reliability, temperature stability and ruggedness.



[Figure 3-7] ACPM5281 (W2100,W900)



[Figure 3-8] ACPM-5202(W1900)

3.6.2 26MHz VCTCXO (X101, DSA221SCL)

The Voltage Controlled Temperature Compensated Crystal Oscillator (VCTCXO) provides the reference frequency for all RFIC synthesizers as well as clock generation functions within the PMB5703 IC. The oscillator frequency is controlled by the PMB5703 ICs.

TRK_LO_ADJ pulse density modulated signal in the same manner as the transmit gain control TX_AGC_ADJ. A two-pole RC lowpass filter is recommended on this control line.

The PM7540 IC controls the handset power-up sequence, including a special VCTCXO warm-up interval before other circuits are turned on. This warm-up interval (as well as other TCXO controller functions) is enabled by the MSM TCXO_EN line . The PM7540 IC VREG_TCXO regulated output voltage is used to power the VCTCXO and is enabled before most other regulated outputs. Any GSM mode power control circuits within the MSM7227 IC require a reference voltage for proper operation and sufficient accuracy.
Connecting the PM7540 IC REF_OUT directly to the MSM7227 IC GSM_PA_PWR_CTL_REF provides this reference. This sensitive analog signal needs a 0.1 µF low frequency filter near to MSM side, and isolate from digital logic and clock traces with ground on both sides, plus ground above and below if routed on internal layers.

ELECTRICAL CHARACTERISTICS
(Ta=25+/-2deg.C, Vcc=2.8V+/-5%)

ITEMS	MIN.	TYP.	MAX.	UNIT	CONDITIONS	REMARKS
Nominal Frequency	---	19.200000	---	MHz	Vcc=2.8V+/-5%, Vcon=0.4 to 2.4V (2)	
Output Voltage(Peak to Peak)	0.8	---	---	V	Load:40pF/5kohm	Ta=-30 to +85deg.C, DC Bias
Power Supply Current (1)	---	---	1.6	mA		
Frequency Tolerance	-1.5	---	+1.5	ppm	Preset Frequency and after 2times reflow soldering	Ta=25+/-2deg.C, Vcon=1.4V
Frequency Stability (CTQ)	-2.0	---	+2.0	ppm	Ta=-30 to +85deg.C	ref.:Ta=25deg.C,
	-0.2	---	+0.2	ppm	Load:40pF+/-10%, 5kohm+/-10%	
	-0.2	---	+0.2	ppm	Voltage 2.8V+/-5%	
Frequency Stability Slope	-0.15	---	+0.15	ppm/deg.C	Ta=-10 to +60deg.C	
	-0.3	---	+0.3	ppm/deg.C	Ta=-30 to -10deg.C, +60 to +85deg.C	
Frequency Aging Rate	-0.7	---	+0.7	ppm/Y	Ta=25+/-2deg.C	One Year
Voltage Control Range	-12.0	---	-7.8	ppm	Vcon=0.4V	ref.:Vcon=1.4V
	7.8	---	12.0	ppm	Vcon=2.4V	
Start up Time	---	---	3.0	msec	90%*Vp-p	Ta=-30 to +85deg.C
	---	---	3.0		Within +/-0.5ppm	
Duty Cycle	40	---	60	%		
Harmonics	---	---	-5.0	dBc		Ta=-30 to +85deg.C
SSB Carrier Noise	---	---	-86	dBc/Hz	@10Hz offset	Ta=25+/-2deg.C
	---	---	-110	dBc/Hz	@100Hz offset	
	---	---	-130	dBc/Hz	@1kHz offset	
	---	---	-144	dBc/Hz	@10kHz offset	
	---	---	-144	dBc/Hz	@100kHz offset	

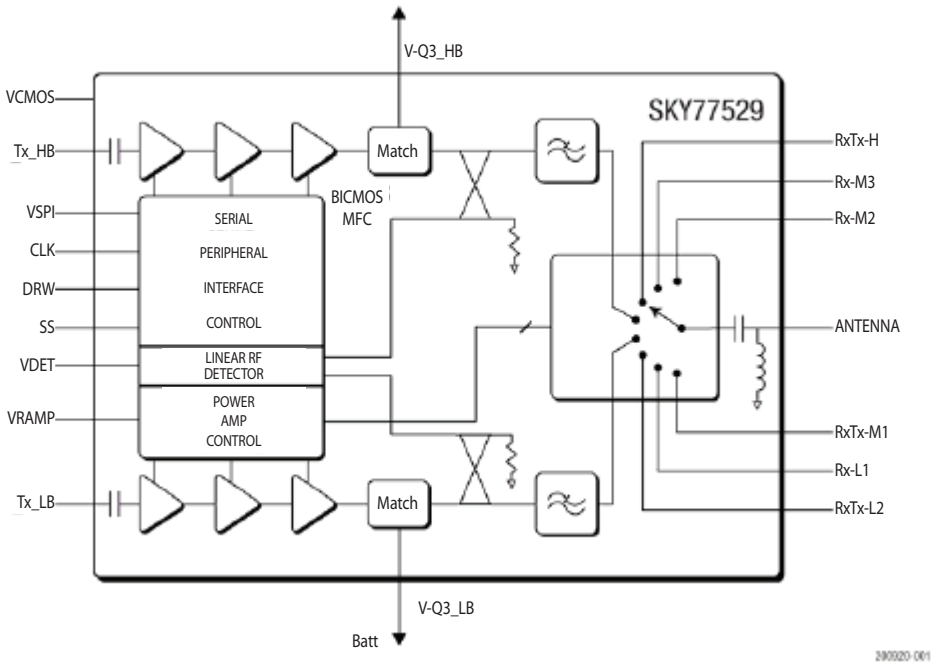
3.6.3 FEM + GSM PAM (U104, SKY77529)

The SKY77529 Tx Front End Module (FEM) is designed in a compact form factor for quad-band cellular handsets comprising GSM850/900, DCS1800, PCS1900, supporting GMSK and linear EDGE modulation. Class 12 General Packet Radio Service (GPRS) multi-slot operation is also supported.

The module consists of a GSM850/900 PA block and a DCS1800/PCS1900 PA block, a printed directional coupler for each block impedance-matching circuitry for 50 Ω input and output impedances, a multifunction power amplifier control (MFC) block, low pass harmonic rejection filters, and an SP8T Antenna T/R switch. Two separate Hetero junction Bipolar Transistor (HBT) PA blocks are fabricated onto an InGaP die; one supports the GSM850/900 bands, the other supports the DCS1800 and PCS1900 bands. The InGaP PA die, the silicon MFC die, PHEMT switch die, and the passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated with plastic overmold.

The FEM incorporates full support for a Serial Peripheral Interface (SPI) bus function. The SPI controller shall accept SPI telegrams with data fields that support PA and switchplexer-related functions. All FEM operating modes and switch states shall be determined by the SPI telegram. The Multi-function Control (MFC) provides pin out for interoperation with a specified transceiver that will establish a closed loop power control mechanism. The external circuit uses the Linear Detector output to set a fixed bias point for 8PSK (EDGE) mode and a variable bias point for GMSK (GSM) mode.

The power control loop together with the MFC will reduce sensitivity to antenna load, input drive, temperature, power supply, and process variation. The combined circuit configures the PA for fixed gain in 8PSK mode while providing the ability to optimize the PA bias at different power levels to maximize efficiency.



[Figure 3-10] SKY77529 Block Diagram

D0	Band Select				D10	D9	Sensor Configuration		
0	Low band				0	0	Current sensor FB Off		
1	High band				0	1	Current sensor FB Off		
D1	Mode Select				1	0	Current sensor FB On		
0	GMSK				1	1	Current sensor FB On		
1	8PSK								
D2	Tx Enable				D15	FE Boost Converter			
0	PA Off				0	Off			
1	PA On				1	On			
			Current Sensor						
D5	D4	D3	Mode = GMSDK	Mode = 8PSK	D14	D13	D12	D11	FE Status
0	0	0	1.6 A	0.6 A	0	0	0	0	Off
0	0	1	1.7 A	0.7 A	0	0	0	1	TX-M GMSK ANT1
0	1	0	1.8 A	0.8 A	0	0	1	0	TX-L GMSK ANT1
0	1	1	1.9 A	0.9 A	0	0	1	1	Reserved
1	0	0	2.0 A	1.0 A	0	1	0	0	RX-L1
1	0	1	2.1 A	1.1 A	0	1	0	1	RX-M2
1	1	0	2.2 A	1.2 A	0	1	1	0	RX-M3
1	1	1	2.3 A	1.3 A	0	1	1	1	Reserved
D8	D7	D6	Not Assigned to Specific Function		1	0	0	0	Rx/Tx-L2
0	0	0	Default		1	0	0	1	Rx/Tx-M1
0	0	1			1	0	1	0	Rx/Tx-H
0	1	0			1	0	1	1	Reserved
0	1	1			1	1	0	0	Reserved
1	0	0			1	1	0	1	Tx-M GMSK ANT2
1	0	1			1	1	1	0	Tx-L GMSK ANT2
1	1	0			1	1	1	1	Reserved
1	1	1							

[Figure 3-11] SPI Write Programming Truth Table

3.6.4 GPS LNA (U802, ALM1612)

The ALM1612 is a GPS Low Noise Amplifier with an integrated SAW filter at the output. Low noise figure, along with high gain, achieved by the ALM1612 makes it ideal for GPS recievers requiring high sensitivity. This module builds upon AVAGO leading edge pHEMT process and integrates input matching and low loss high rejection SAW filter at the output. This results in high performance and a reduced solution size. The ease of implementation simplifies the reciever design.

The ALM1612 is packaged in a compact 3.3 mm x 2.1 mm x 1.2 mm package with low external component count required to achieve the best-in-class performance.

3.7 Digital Baseband (OMAP3630 / X-GOLD 616)

3.7.1 General Description

A. Features (OMAP3630)

The OMAP3630 high-performance, multimedia application device is based on the enhanced OMAP 3 architecture and ins integrated on TI advanced 45-nm process technology

The architecture is designed to provide bes-in-class video, image, and graphics processing sufficient to support the following

-Streaming video

-2-dimension / 3-dimensionmobile gaming

-High-resolution still image

-Support OS such as Windows CE / Symbian OS / Linux / Android OS

-Microprocessor unit subsystem based on the ARM cortex –A8

-Imaging video and audio subsystem with TMS320C64x DSP core

-L3/L4 interconnects that provide high-bandwidth data transfers for multiple initiators to the internal and external memory controllers and to on-chip peripherals

-120-KB ROM / 64-KB single-access SRAM on-chip memory

-Peripherals

-Universal asynchronous receiver/transmitter , Three general interface & UART + IrDA SIR

-Multichannel buffered serial port, Three general purpose and two audio loopback capable

-Three master/slave inter-integrated circuit(I2C) high speed standard interfaces

-High speed multiport USB host and High speed USB ON-The-Go

-High-speed controller that offers high-speed data transactions on a USB port with embedded DAM

-High speed MMC/SD/SDIO 1/2/3

-General purpose times (eleven GP timers)

-Two Watchdog timers / 32 kHz clock timer

- Six 32-bit GPIO controllers

B. Features (X-GOLD 616)

The X-GOLD 616 is GSM/UMTS/GPRS/EDGE/HSDPA/HSUPA baseband controller with integrated mixed signal audio and measurement subsystem and modem power management unit.

The processing of the upper 2G.3G cellular protocol stack layer are handled by and ARM 1176 embedded microcontroller

The Key features are following

-Audio : Loudspeaker (stereo) / external chip support / microphone and other audio input / ringtones

-Modem : 3GPP release 6 / HSDPA category 8 / HSUPA category 6 /E-GPRS class 33 etc.

-ARM 11 : operating frequency 416MHz

-Sensors with analog measurement interface

-Memory types : SDRAM / LPDDR1-DRAM / NOR / DDR-NOR / eSD / eMMC / SD / MMC

-High speed interface to SIM & USB 2.0 HS

-Package size : 8 × 8 × 0.8 mm, 0.4 mm pitch

3.8 Hardware Architecture

<System HW Block>

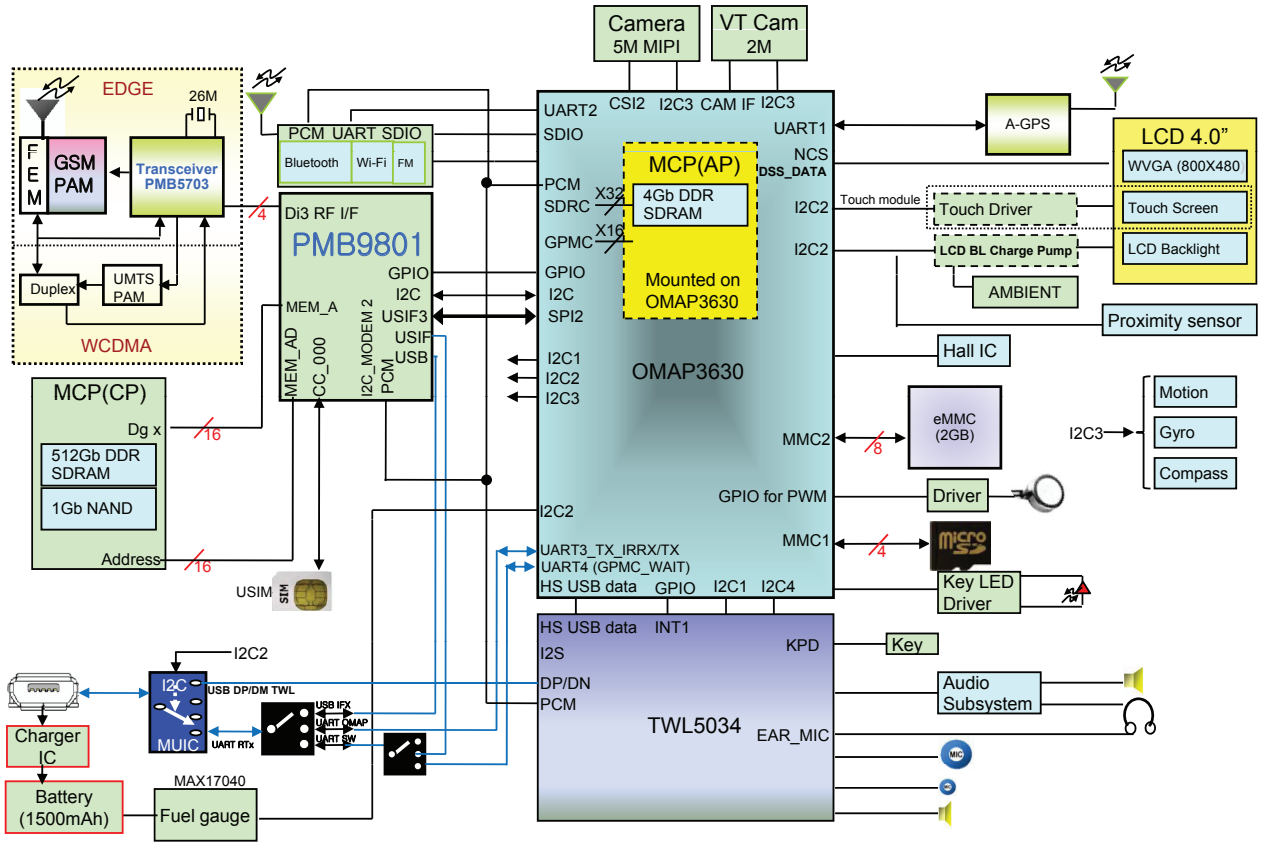
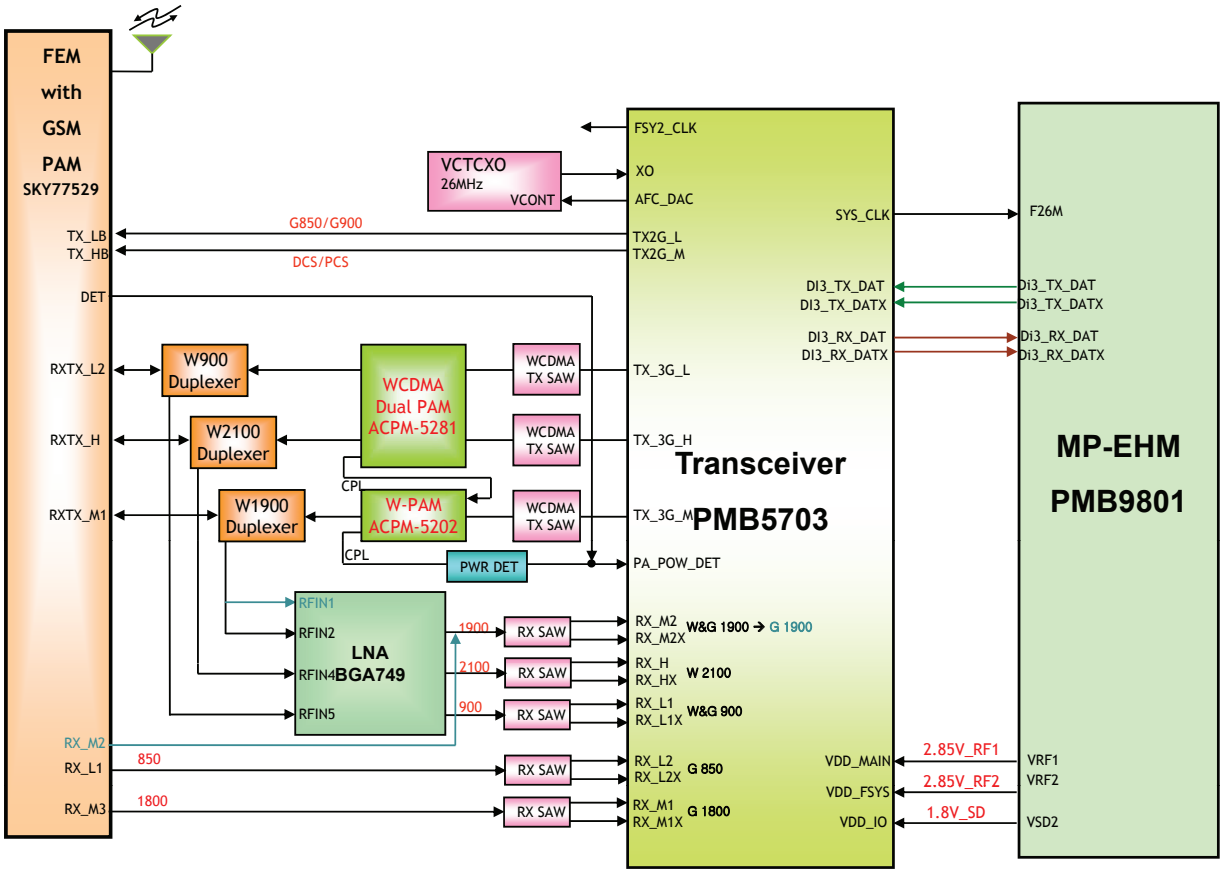


Figure. Block Diagram

<Detail 1 : RF Block>



3.9 Subsystem(PMB9801_X-GOLD^{TM}616)

3.9.1 ARM Microprocessor Subsystem

The ARM1176JZ-S incorporates an integer unit that implements the ARM11 ARM architecture v6. The core supports the 32-bit ARM and 16-bit Thumb instruction sets, Jazelle technology to enable direct execution of Java byte codes and a range of SIMD DSP instructions that operate on 16-bit or 8bit values in 32-bit registers.

3.9.2 WCDMA Subsystem

The 3.5G cellular modem is implemented as an independent Layer1 subsystem including a separate microcontroller. The X-GOLDTM616 Modem core acts as a master controlling the 3.5G cellular Modem slave via the Layer1 host controller interface.

The 3.5G cellular modem consists of a number of superblocks.All higher rate physical layer data connections are realized by a dedicated bus system using dedicated soft bit RAM (SBRAM) blocks serving as data buffers in between the inner receiver (IRX) and outer receiver (ORX) peripherals for UMTS and HSDPA demodulation and channel decoding. The AHB buses are mainly used for configuring the HW peripherals and collection of measurement results and reportings of the peripherals by the 3G modem controller:

The individual superblocks are:

• SB_COM: including

– The communication RAM (COMRAM) for HCI command exchange and physical layer data exchange in both 3.5G transmit and receive direction

– Buffering of communication flags, implementing the notification mechanism between host and 3G modem controller based on interrupts in both directions

– RLC (radio link control)/MAC (medium access control) accelerators (MACPHY-UL and MACPHY-DL) supporting the data processing of the Layer 2 protocol stack entities RLC and MAC in both uplink and downlink direction

– Access to the crossbar via the 3G_Master interface and the multi master AHB_3G_MASTER bus. The MACPHY units have master access to the crossbar via the 3G_MASTER master interface. The 3G_Master interface can also be accessed from the ARM7 via an AHB2AHB bus bridge connected to the AHB_3G_SYS bus.Simple round robin arbitration of AHB_3G_Master between the three masters is implemented.

– Access from the crossbar via the 3G_MACOM slave interface

– Access from the 3G modem controller subsystem via the 3G_MEMIF bus

• SB_uC: including

– The 3G modem controller subsystem including the AHB_3G_SYS bus, and master interfaces to three peripheral buses 3G_MEMIF, AHB1_3G_L1 and AHB2_3G_L1

– The USIF trace interface

– The Mtrace trace interface to the MIPI port

– The interrupt control unit ICU

–An AHB2AHB bridge connecting the 3G modem controller to the 3G_Master interface via AHB_3G_SYS

• SB_TXSR: including

– The UMTS cell searcher (SRCH) HW peripheral

– The UMTS delay profile estimator (DPE) HW peripheral

– The measurement RAM (MRAM) buffering the results of both SRCH and DPE

– Access from the 3G modem controller subsystem to MRAM via the 3G_MEMIF bus

– Transmit modulator (TxMod) and transmit bit processor (E-TxBitProc) HW peripherals performing transport channel multiplexing, channel coding and modulation for all uplink data streams. These blocks exchange data via a dedicated RAM SBRAM-TX

– Access to the transport blocks stored in the COMRAM by the E-TxBitProc via the dedicated bus system

– Configuration access from the 3G modem controller subsystem via the AHB_3G_L1 AHB bus

• SB_RAKE: including

– The DSP subsystem performing sub-slot signal processing and control for the Rake and HSDPA-IRX peripherals. The DSP subsystem is connected to the 3G modem controller via shared memory and interprocess communication via comunication flags, and to the Rake and HSDPA-IRX peripherals via a dedicated bus

– The Rake inner receiver HW peripheral performing demodulation of all UMTS and HSUPA physical channels

– Configuration Access from the 3G modem controller subsystem via the AHB_3G_L1 AHB bus

– Access to the SBRAM1 performing framewise storage of the demodulated coded composite transport channels via the dedicated bus system

• SB_ORX: including

– The SBRAM1 performing framewise storage of the demodulated coded composite transport channels via the dedicated bus system

– The SBRAM2 performing TTI wise storage of the demodulated transport channels via the dedicated bus system

– The R99-ORX (Outer Receiver) HW peripheral performing transport channel demultiplexing, de-rate matching and channel decoding of all UMTS downlink physical channels

– Configuration access from the 3G modem controller subsystem via the AHB_3G_L1 AHB bus

– Access to write decoded transport

• SB_HSDPA: including

– The HSDPA-IRX inner receiver HW peripheral performing demodulation of HS-PDSCH and demodulation and decoding of HS-SCCH HSDPA physical channels

– The SBRAM3 performing framewise storage of the demodulated coded composite transport channels via the dedicated bus system

– The SBRAM4 performing TTI wise storage and HARQ (hybrid ARQ) buffering via the dedicated bus system – the HSDPA-ORX (Outer Receiver) HW peripheral performing transport channel demultiplexing, de-rate matching, HARQ processing and channel decoding of all UMTS downlink physical channels

– Configuration Access from the 3G modem controller subsystem via the AHB_3G_L1 AHB bus

– Access to write decoded transport blocks into the COMRAM via the dedicated bus system

• SB_DIGRF: including

– The DigRF interface (compliant with DigRF Interface V3.09), which is used to transfer the complete 3.5G and 2.5G GSMEDGE data and control information for both receive and transmit direction using the DigRF V3.09 packet structures from X-GOLD™618 to suitable RF transceiver ICs

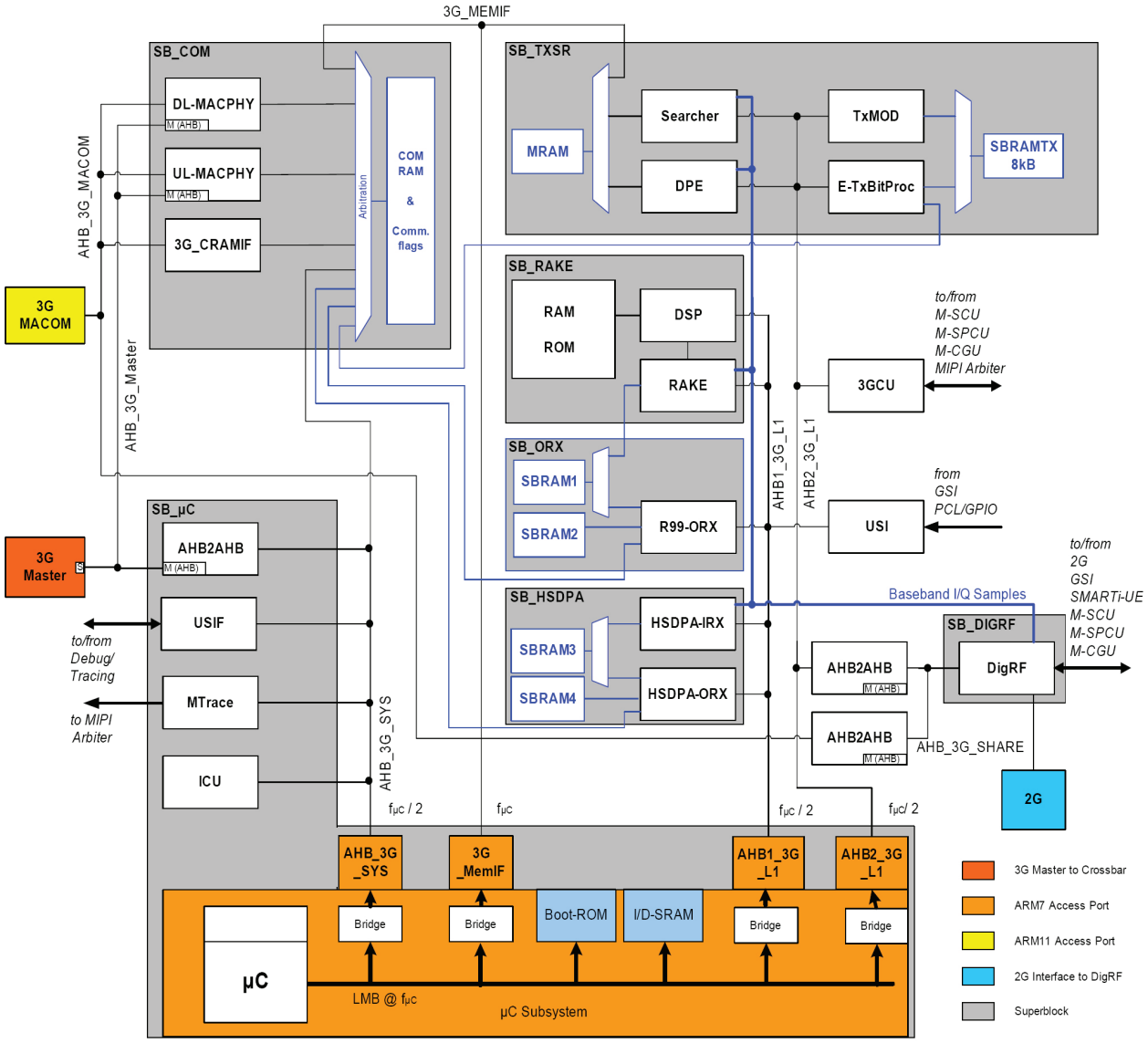
– Access from AHB_3G_Shared which is a multi master AHB bus shared between host controller and 3G modem controller. The access must be shared since both controllers need configuration access e.g. for writing control sequences, and reading status information from the 2G and 3G RF transceivers. Master access from the 3G modem controller subsystem is provided via an AHB2AHB bridge. Master access from the ARM11 side is provided via the 3G_MACOM crossbar interface and an AHB2AHB bridge. Simple round robin arbitration of AHB_3G_Shared is implemented

– Access from the 2G side for 2G data read and write access to and from the RF side

• Several individual blocks on top level: including

– The UMTS System Interface (USI), consisting of the the UMTS Timer used for highly accurate interrupt and trigger generation for the L1 FW, UMTS HW peripherals, AGC, and the Control Sequencer, used to process more complex trigger and switching sequences (e.g. typical RF control sequences) which are programmed by firmware into a sequence RAM. A sequence is started manually or via a trigger signal from the UMTS Timer

– The 3G Control Unit (3GCU) consisting of System Control Unit (3G-SCU), System Power Control Unit (3GSPCU) and Clock Generation Unit (3G-CGU) for the 3.5G subsystem.The 3GCU is responsible for the control of the 3G subsystem. It is tightly coupled to the Master Chip Control Functions of the 2G subsystem in the X-GOLD™618.



WCDMA

• 3GPP WCDMA FDD Multimode Type II UE Protocol Stack

• Configurable for data classes up to 384 Kbit/s

• Inter-RAT Handover and Cell Reselection.

• Supports two types of Compressed Mode.

• Network Assisted Cell Change from UTRAN to GERAN and GERAN to UTRAN.

• Conforms with ETSI UICC Specifications.

• SIM/USIM support.

• A-GPS support.

• CS Data (transparent/non transparent up to 64kBit/s; Support for Video Telephony)

Release 5 - HSDPA

• High Speed Downlink Packet Access (HSDPA)

• Compliant with 3GPP Release 5.

• Supporting HSDPA Category 8, up to 7.2Mbps.

• IPv6 support.

Release 6 - HSUPA

• High Speed Uplink Packet Access (HSUPA)

• Compliant with 3GPP Release 6.

• Supporting HSUPA category 6, up to 5.8Mps.

• Robust Header Compression (RoHC).

• Fractional DPCH.

• WB-AMR Support.

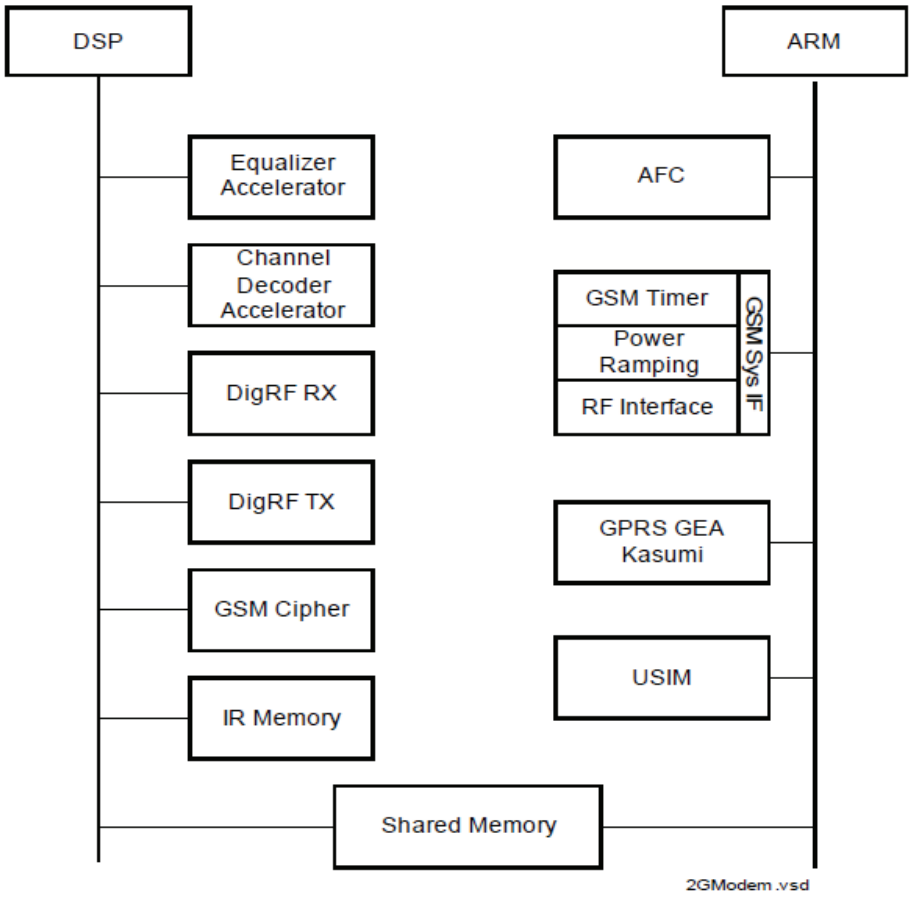
3.9.3 GSM Subsystem

The X-GOLDTM616 is suited for mobile stateons operating in the GSM850/900/1800/1900 band. In the receiver path the antenna input signal is converted to the base band, filtered, and amplified to target level by the RF transceiver chip set. Tne modem processor performs for both, GMSK and 8-PSK, the complex baseband signal equalization with soft-output recovery and the channel decoding supported by a Viterbi hardware accelerator.

- RMS calculation for field strength measurements (monitoring)
- Detection and evaluation of frequency correction bursts (FCB)
- Equalization of GMSK and 8PSK normal bursts as well as synchronization bursts with bit-by-bit soft output.
- Single Antenna Interference Cancellation (SAIC) for GMSK and 8PSK channels.
- Channel encoding and soft-decision channel decoding for all supported GSM/GPRS/EDGE speech, data and control channels
- Synchonization channel (SCH) and control channels including RACH and PRACH
- FR, HR, EFR speech channels (TCH/FS, TCH/HS, TCH/EFS)
- NAMR/WAMR speech channels over GMSK and 8PSK
- Mandatory sub-functions for speech channels:
  - Discontinous transmission (DTX)
  - Voice activity detection (VAD)
  - Background noise calculation
- Fullrate and halfrate data channels (F14.4, F9.6, F4.8, F2.4, H4.8, H2.4)
- GPRS class 33 support for coding schemes CS1..CS4
- Fast USF detection algorithm for MAC layer
- EGPRS class 33 support for modulation and coding schemes MSC1..MSC9
- Incremental redundancy (ARQ2) for EGPRS
- Dual transfer mode (DTM) class 33

GSM/GPRS/EDGE

- Supports GSM, GPRS and EDGE up to Class 33.
- EDGE Coding Schemes MCS1 to 9.
- CSD
- R4 GERAN Feature Package 1
- SAIC / DARP
- Repeated FACCH and repeated SACCH
- A-GPS Support
- Support for WB-AMR
- GPRS ROHC



• The Equalizer Accelerator is used to speed up the viterbi trellis search in the equalizer
• The Channel Decoder Accelerator is used to speed up the viterbi trellis search in the channel decoder
• The DigRF RX block is the interface for receiving samples from the RF
• The DifRF TX block is the interface for transmitting samples to the RF
• The GSM Cipher is used for encrypting and decrypting data in circuit switched calls
• The IR memory is needed for storing incremental redundancy data in a EGPRS call
• The shared memory is used to exchange data and control information between DSP and ARM
• The AFC is used for controlling the (external) VCXO in the frequency control loop
• The GSM system interface is used to program the timing of all GSM related signals
• The GPRS GEA Kasumi is used for encrypting and decrypting data in packet switched calls
• The USIM is the SIM card interface

3.9.4 RF Interface

The RF interface communicates with the mobile station's external RF and analog baseband circuits. Signals to these circuits control signal gain in the Rx and Tx signal path and maintain The system's frequency reference.

3.9.5 SPI based IPC

The XMM™6160 platform supports the serial connection via SPI. The command flow of the IPC is independent from the HW solution and the IPC protocol. It is implemented using a logical channel multiplexer and AT commands.
The IPC hardware interface consists of a serial SPI interface and two control signals, and one additional optional control signal. The SPI is implemented using the USIF2 of the X-GOLD™616, with the GPIO's implementing sleep mode and readiness handling

3.9.6 Audio function

Audio Processing on ARM Core

The ARM™1176 core is mainly in charge of “audio application” tasks, including audio playback, audio streaming and audio recording if required. This implies the usage of codec algorithms such as MP3, WMA, AAC etc., which must be implemented as decoder and/or encoder software on the ARM core. Decoded audio streams are transmitted as PCM samples to the DSP core via a shared memory. Audio streams to be encoded are transmitted by the DSP to the ARM core via a shared memory. The ARM can also generate ring tones and service tones to notify an incoming call, an incoming message or any audio notification of a phone´s event (warning, error, confirmation, battery low, etc.). Another activity on the audio side for the ARM is the streaming of compressed audio data over the UART interface to the Bluetooth chip for A2DP usage (Advanced Audio Distribution Profile: audio playback over Bluetooth). Via the same interface it communicates with the Bluetooth chip (this is not restricted to audio activities). The ARM core is managing the configuration of the AFE by sending commands to the DSP over shared memory to activate various configurations of the AFE. Note that the activities of the ARM remain purely digital audio processing.

Audio Processing on DSP Core

The DSP core is in charge of “speech audio” and mixing tasks and its activities remain - as the ARM - purely digital audio. The DSP can also execute some “audio application” tasks. It ensures the simultaneous encoding and decoding of speech audio frames during telephone conversation. It uses different sets of vocoders as specified by the applicable standards for the ongoing telephone conversation. On the audio out path (i.e. towards the speaker) it mixes “audio application” received over shared memory with decoded speech audio. On this path it can also mix some audio samples coming from the microphone to enable the feedback loop to the speaker (Sidetone generation, as specified in 3GPP/ TS 43.050, chapter 3.10). On the audio in path (i.e. from the microphone to the transmission of the encoded audio samples over the air) the DSP can also mix speech audio samples with any other digital audio source and analogue FM radio as well. The mixing capabilities are extremely broad as the cases mentioned above are only examples. These mixing capabilities also include the ability to execute a sample rate conversion to bring all samples to the same rate before mixing. The DSP also can execute some audio application tasks such as PCM, ADPCM, SB-ADPCM audio playback and recording. Simple Tone (sine tones, DTMF, key click) can be generated as well.

The next activity of the DSP is transferring data to and from the hardware peripherals (AFE, I^2S0 and I^2S1). Asmentioned in **Figure 1** a fifo buffer is used to exchange stereo audio samples between the DSP and the AFE on the microphone path and speaker path. When receiving a command from the ARM the DSP directly configures the different modes of the AFE. The DSP also manages the I^2S interfaces I^2S0 and I^2S1. I^2S0 interface, configured as master interface, is used to exchange speech audio samples at a rate of 8 or 16 kHz mono on both directions with the Bluetooth chip in the case of a speech call using a Bluetooth headset. The I2S1 interface can be used as slave or master interface, enabling the exchange of audio stereo samples at any common rate between 8 and 48 kHz, potentially asymmetrically between RX and TX. This is to act as an audio bridge with an external audio chip (application processor, audio processor,etc.). Note that the activities of the DSP - like the ARM - remain purely digital audio processing. Refer to the document “system requirements specification” for more details on the different audio application features supported by the chip.

Audio Processing on Audio Front End

The AFE is used as a playback and capture device, i.e. exchanging digital audio stereo samples on both directions (from microphone to DSP and from ARM/DSP to speaker). On audio-in path analog to digital conversion and amplification is executed. On the audio-out path digital to analog conversion and power amplification is performed. Additionally, the AFE physically selects the correct audio analog paths and is directly managing the analog inputs and outputs.

3.9.7. Vocoder Subsystem

FR, HR, EFR speech channels (TCH/FS, TCH/HS, TCH/EFS)

• NAMR/WAMR speech channels over GMSK and 8PSK

• Mandatory sub-functions for speech channels:

  – Discontinous transmission (DTX)

  – Voice activity detection (VAD)

  – Background noise calculation

• Fullrate and halfrate data channels (F14.4, F9.6, F4.8, F2.4, H4.8, H2.4)

3.9.8 Memory Subsystem

The X-GOLD™616 can use the general term SDRAM as a shortcut for Mobile DDR SDRAM. A total of up to four external memories is supported, chip selects can be dynamically allocated to one of the two external memory controllers of X-GOLD™616. Only two memory devices can be connected to the SDRAM controller if DDR support is required.

3.9.9 Battery Management – Hardware Configurations

The X-GOLD™616 chip has an internal PMU that will provide power supply for the chip itself, memory and the attached RF. The X-GOLD also holds a measurement unit that can perform all necessary battery measurements through external HW. This is sufficient for a modem only design where charging is controlled by another chip

3.9.10 General-Purpose Input/Output Interface

The X-GOLD™616 chip has an internal PMU that will provide power supply for the chip itself, memory and the attached RF. The X-GOLD also holds a measurement unit that can perform all necessary battery measurements through external HW. This is sufficient for a modem only design where charging is controlled by another chip

3.9.11 Clocking

The clocking system is based on 2 different clocks, a 26 MHz reference clock generated within the RF Engine and a 32 kHz real-time clock (RTC) generated in the baseband.The 26 MHz clock provided by the RF engine is the main reference clock for the RF circuit and the X-GOLD™616. Also other system components may be supplied with 26 MHz reference clocks. A 32 kHz oscillator located at the X-GOLD™616 supplies the RTC with the reference clock for the real time clock application, as well as provides a low power standby clock for system sleep mode operation. This clock is available
also for other system components like GPS.

3.9.12 USB

The XMM™6160 platform provides two USB interfaces compliant to the USB2.0 standard:

• High speed interface (480 Mbps) for communication with external devices acting both as host or device

• Full speed interface (12 Mbps) for communication with the UICC using the IC-USB standard acting as host

The USB solution is based on USB controller hardware IP, which is integrated in the X-GOLD™616 baseband chip including both USB transceivers for high and full speed and the USB Stack software that implements the different USB device classes and features.

The HS OTG USB component supports the following features:

• Modem connection for DialUp Networking and AT command interface (CDC-ACM)

• Tracing over USB (CDC-ACM)

• Suspend/Resume and Remote Wakeup (for power saving)

• Software download

Optional features (not included in the XMM™6160 platform):

• Support for isochronous transfers

The IC-USB component supports the following features:

• UICC-Terminal USB interface according to ETSI TS 102 600 (ICCD only)

•Suspend/Resume and Remote Wakeup (for power saving)

3.10 Power Block

3.10.1 General

Since P970 uses two individual chips, XMM6160 (IFX Modem) uses integrated PMIC and OMAP3630 uses TWL5034 as a main PMIC.

3.10.2 XMM6160 (IFX Modem)

X-GOLD™616 is a single integrated circuit UMTS/GPRS/EDGE Baseband Controller with integrated mixed signal audio and measurement subsystem and modem power management unit. This system on chip designed in Infineon's low power 65nm CMOS process technology provides the performance to meet the ever increasing demands of the cellular subscriber market for feature rich terminals at lowest power consumption and a very competitive cost position.

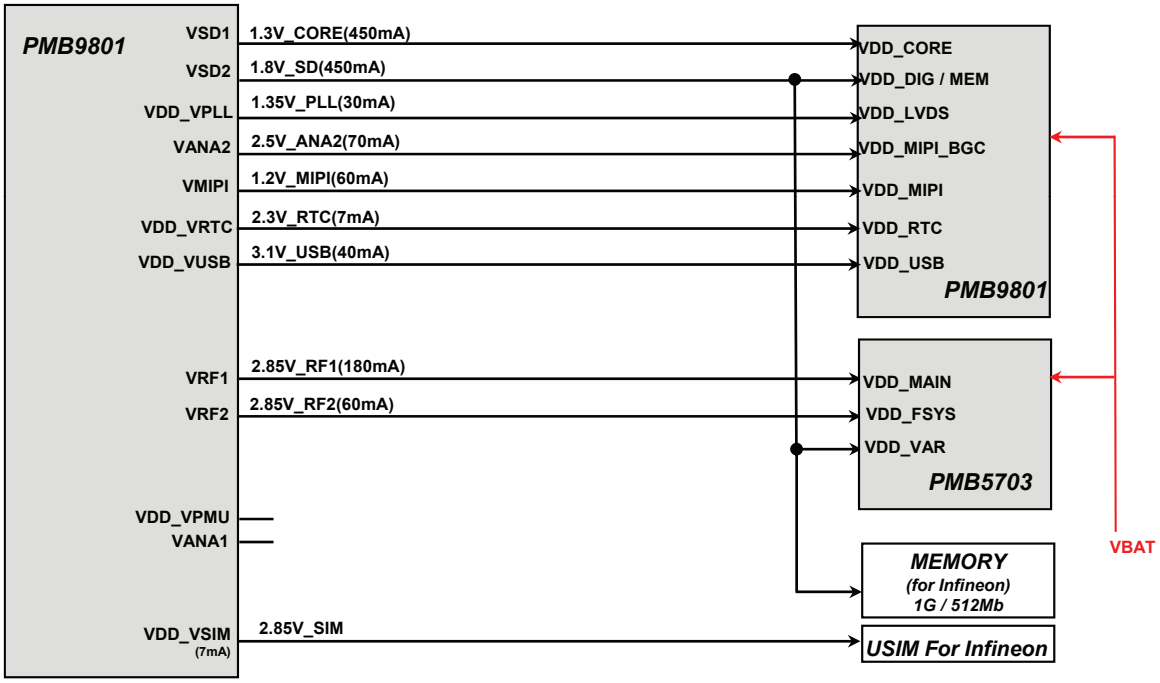


Figure. LGP970 Modem Power Block Diagram

3.10.3 TWL5034

The TWL5034 is an integrated power management for mobile devices that use the OMAP's application processors (AP), or other similar application processors. The TWL5034 includes three high efficiency step-down regulators and 17 LDOs to power the application processor, internal Logic, I/O, memory, and system accessories. An additional the device provides LED driver circuitry to power two LED circuits(LED A,LEDB) that can illuminate a panel or provide user indicators. The LED A can provide up to 160 mA and the LED B, 50 mA. Each LED circuit is independently controllable for basic power (on/off) control and illumination level (using PWM).

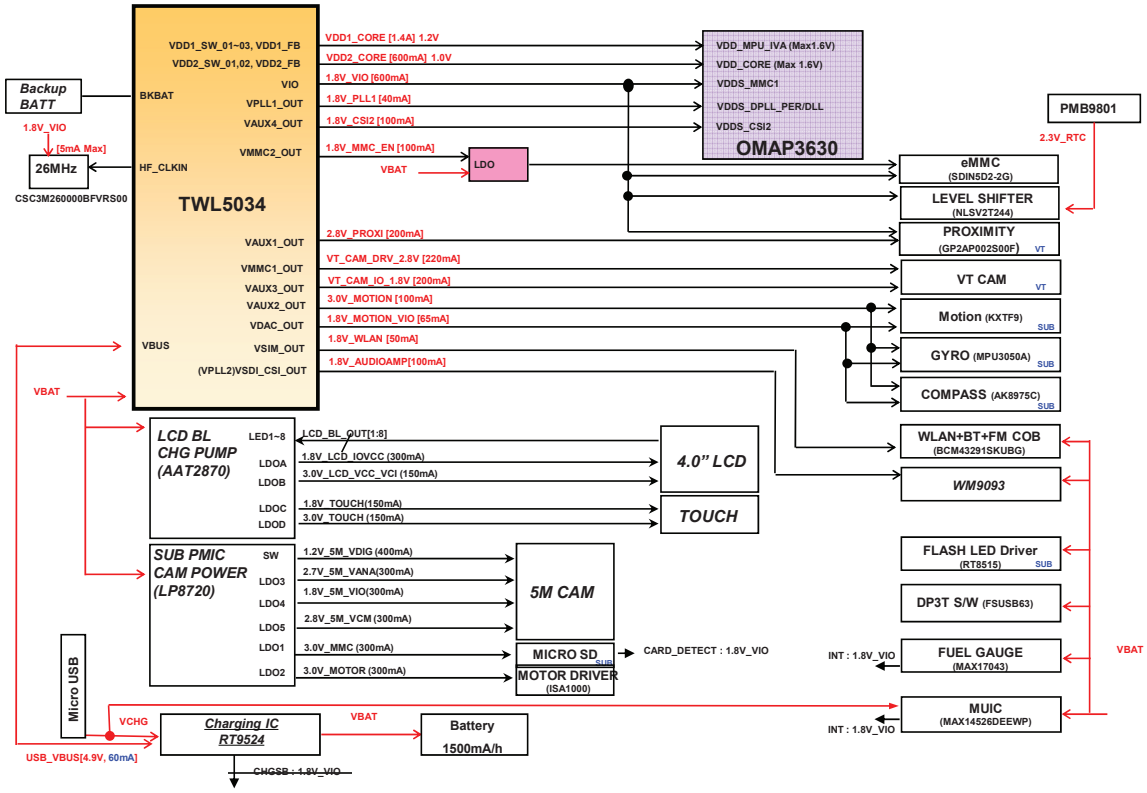


Figure. TWL5034 functional block diagram

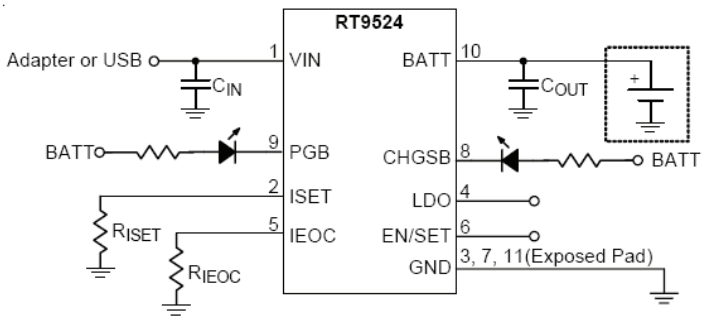
3.10.3 Charging control

P970 uses individual Charger IC which is RT9524.

Features

- 28V Maximum Rating for DC Adapter
- Internal Integrated Power MOSFETs
- Support 4.2V/2.3A Factory Mode
- 50mA Low Dropout Voltage Regulator
- Status Pin Indicator
- Programmed Charging Current
- Under Voltage Lockout
- Over Voltage Protection
- Thermal Feedback Optimized Charge Rate
- RoHS Compliant and Halogen Free

Typical Application Circuit



Functional Pin Description

Pin No.	Pin Name	Pin Function
1	VIN	The Input Power Source.
2	ISET	Charging Current Setting.
3, 7, 11 (Exposed Pad)	GND	Ground. The exposed pad must be soldered to a large PCB and connected to GND for maximum power dissipation.
4	LDO	LDO Output (4.9V). This pin provides 50mA output current.
5	IEOC	End-of-Charge Current Setting. The I_{EOC} is from 5% to 50% Ichg-fast which is programmed by the ISET pin.
6	EN/SET	Enable and Operation Mode Setting.
8	CHGSB	Indicator Output for Charging Status.
9	PGB	Indicator Output for Power Status.
10	BATT	Battery Charge Current Output.

3.10.3.2 Constant Current Charging

Battery Pre-Charge Current

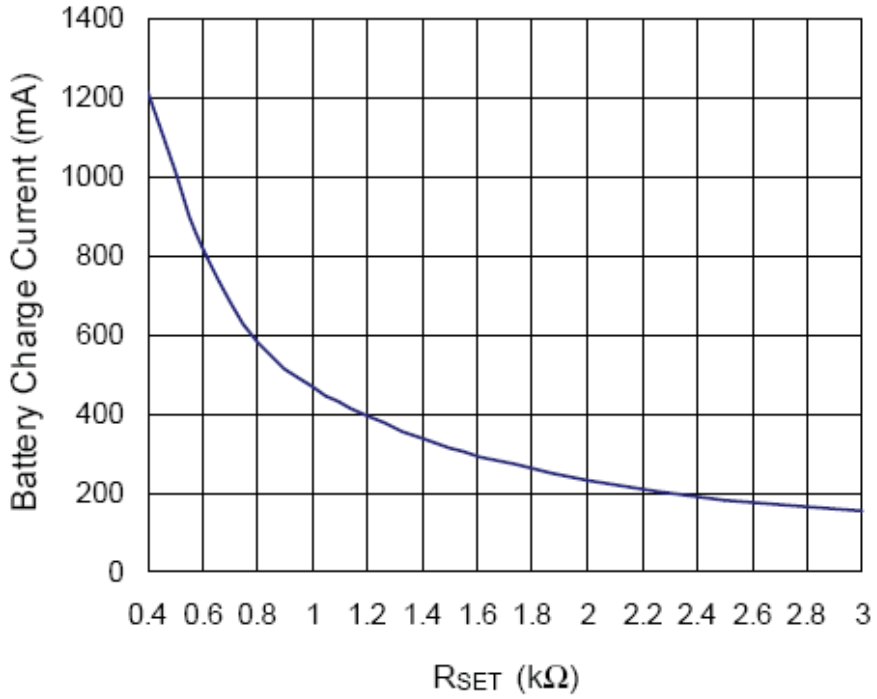
During a charge cycle, if the battery voltage is below the pre-charge threshold, the RT9524 enters the Pre-charge mode. This feature revives deeply discharged cells and protects battery. Under USB100 Mode, the pre-charge current is internally set to 95mA. When the RT9524 is under USB500 and ISET Mode, the pre-charge current is 20% of fast-charge current set by external resistor RISET.

Battery Fast-Charge Current

ISET Mode

The RT9524 offers ISET pin to program the charge current. The resistor RISET is connected to ISET and GND. The parameter KISET is specified in the specification table.

$$I_{Charge} = \frac{K_{ISEF}}{R_{ISET}} ; K_{ISEF} = 530$$



Battery Voltage Regulation (CV Mode)

The battery voltage regulation feedback is through the BATT pin. The RT9524 monitors the battery voltage between BATT and GND pins. When the battery voltage closes in on the battery regulation voltage threshold, the voltage regulation phase begins and the charging current begins to taper down. When the charging current falls below the programmed end-of-charge current threshold, the CHGSB pin goes high to indicate the termination of charge cycle. The end-of-charge current threshold is set by the IEOC pin. The resistor R_{EOC} is connected to IEOC and GND. The parameters K_{EOC} and IEOC are specified in the specification table.

$$I_{EOC}(\%) = \frac{R_{EOC}}{K_{EOC}} \; ; K_{EOC} = 200$$

The current threshold of IEOC (%) is defined as the percentage of fast-charge current set by R_{ISET}. After the CHGSB pin is pulled high, the RT9524 still monitors the battery voltage. Charge current is resumed when the battery voltage goes to lower than the battery regulation voltage threshold.

3.10.3.3 Constant Voltage Charging

Constant voltage charging begins when the battery voltage reaches a target voltage, 4.2V. The end of constant voltage charging is commonly detected around 240mA from Travel adaptor.

3.10.3.4 LGP970 Charging Specification

-Charging Method : CC & CV (Constant Current & Constant Voltage)

-Maximum Charging Voltage : 4.2V

-Maximum Charging Current : 946mA

-Nominal Battery Capacity : 1500mAh

-Charging time : Max. 3h 30m

- Full charge indication current (icon stop current) : 156mA

3.10.3.5 LGP970 battery bar icon display

Battery Bar Number	Specification	
BAR 6 (Full)	90% over	Remain %
BAR 6 --> 5	90% → 89%	
BAR 5 --> 4	70% → 69%	
BAR 4 --> 3	50% → 49%	
BAR 3 --> 2	30% → 29%	
BAR 2 --> 1	15% → 14%	
BAR 1 --> 0	5% → 4%	
Low Battery Pop-up	4% ~ 15% : One Time popup	
Critical Low Battery Pop-up	0% ~ 3% : Popup at every level change	
POWER OFF	0%	

Table. LGP970 battery bar specification

3.11 External memory interface

3.11.1 Introduction

Since LGP970 contains communication and application processor, memory is dedicated only for each processor. XMM6160 (IFX modem) uses MCP (Multi Chip Package) 1Gb nand / 512Mb LPDDR1 and AP20 uses POP (Package on Package) 512MB LPDDR1 and 2GB eMMC nand memory.

3.11.2 LGP970 XMM6160 (IFX Modem) memory Interface

-Multi Chip Package : DDR SDRAM and NAND Flash merged 1 package
-512Mbit Mobile DDR SDRAM / 1Gbit NAND Flash

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
H8BCS0QG0MMR-46M	NAND	Hynix	1.8V	45ns
	SDRAM		1.8V	166MHz

3.11.3 LGP970 OMAP3630 memory Interface

- Package on Package on OMAP3630: LPDDR1 512MB SDRAM
- 8GB eMMC 4.4 version

LPDDR1 SDRAM

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
H8MBX00U0MER-0EM	SDRAM	Hynix	1.8V/1.2/1.2/1.2	DDR1 400 (200MHz)

8GB NAND

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
SDIN5D2-2G	NAND	Sandisk	3.3V	15MB/s for read 9MB/s for write

3.11.4. External SD card memory Interface

TI OMAP3630 supports external SD card which supports up to 32GB (SDHC compatible)

3.12 H/W Sub System

3.12.1 RF Interface

The base band is connected via a DigRF high speed data interface with a maximum clock frequency of 312 MHz. The pure digital interface enables the digital baseband to shrink efficiently, as all the analog functionality is within the RFIC. All data and control traffic is multiplexed via the RX and TX interface lines. The IC features a high level programming model enabling the complete compressed mode operation of the device in an RF engine environment. It handles RX and TX power control, also incorporating the calibration data.
The complete timing is optimized for compressed mode operation of the transceiver, it controls the front end components of the engine (PA´s, switches, LNA´s). Additionally a SPI control bus for front end component control is available in the IC, which also enables the readback of data from external components, thus the handling of functions like PA saturation, mismatch detection, overheating (incorporated in the closed loop power control) can be adopted.

3.12.1.1 DigiRF Interface

- RESET_N : RESET Input Signal for master reset
- ALERT_N : 3G PLL Lock Status Output Signal
- SYS_CLK : 3G DigRF System Clock Output
- DI3_TX_DAT, DI3_TX_DATX : 3G DigRF TX Input Data (Positive / Negative)
- DI3_RX_DAT, DI3_RX_DATX : 3G DigRF RX Input Data (Positive / Negative)

3.12.1.2 About Clock

- REF_CLK_EN, SYS_CLK_EN, FSYS2_EN, FSYS3_EN
- AFC_DAC : AFC DAC Output; analog output: 12 bits
- XO_SUP : Supply Voltage Output for TCVCXO
- SYS_CLK : 3G DigRF System Clock Output
- FSYS2, FSYS3, FSYS4 : 26 MHz Reference Clock Output

3.12.1.3 General Control Logic Signals

- PA Control Outputs
  PA_EN1, PA_EN2, PA_EN3, PA_EN4 : PA Control Output
  PA_BSEL : PA Band Select Control Output
  PA_MODE : PA Mode Select Control Output
  PA_RAMP : PA Ramping Voltage for GMSK and 8-PSK; analog output: 11 bits
  PA_BIAS: PA Bias Voltage PA_POW_DET
- Frontend Control
  FE_CTRL1~6 : Front-end Control Output
  SPI(SPI_CLK, SPI_SS, SPI_DRW) : FEM Control Interface
- LNA Control
  LNA_CTRL1, LNA_CTRL2, LNA_CTRL3, LNA_CTRL4 : LNA Control Output

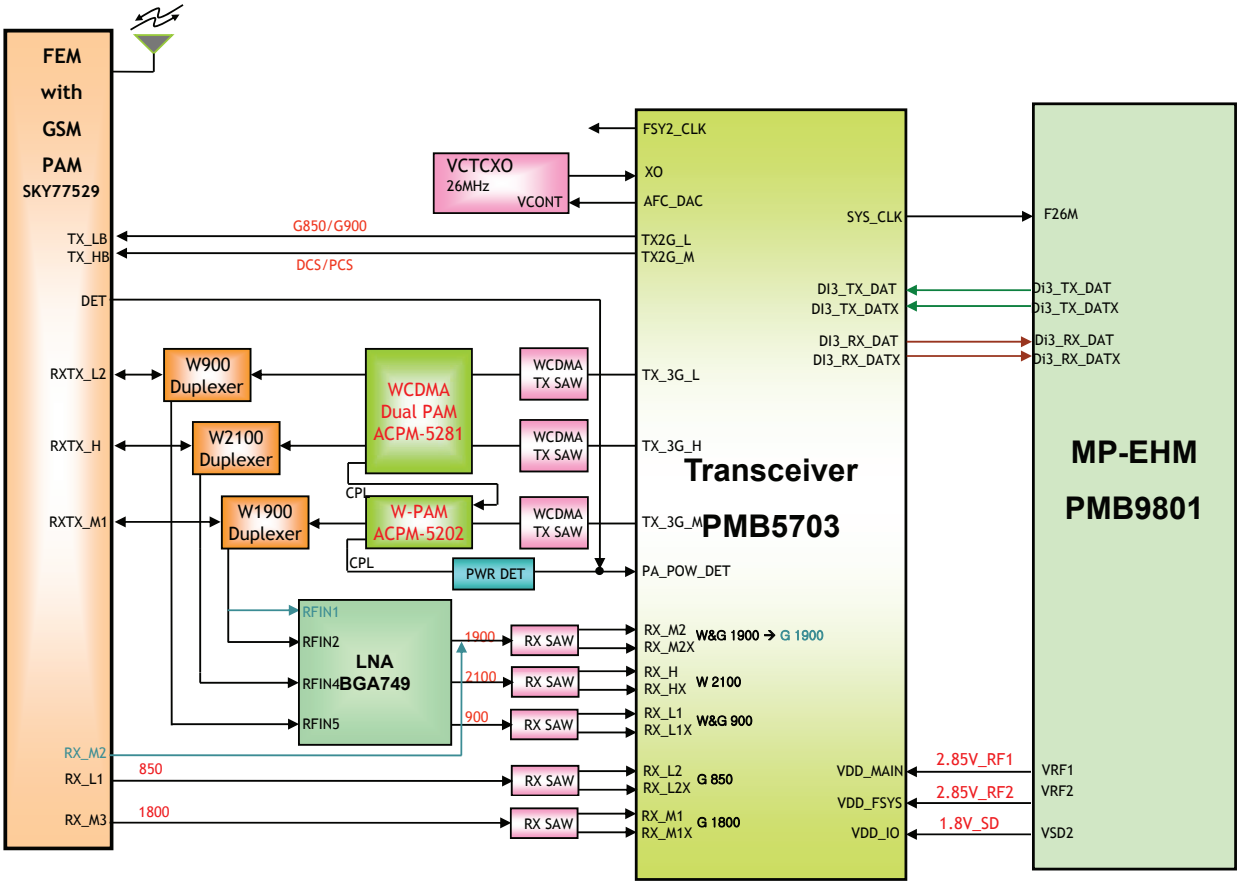


Figure. RF Interface Block Diagram

3.12.1.4 BCM43291SKUBG (BT / WiFi / FM module)

3.12.1.4.1 WiFi

* WLAN_CMD : WLAN SDIO Command Line.
* WLAN_CLK : WLAN SDIO Clock Input.
* WLAN_SDIO[3:0] : WLAN SDIO Data Line.
* WLAN_RESET_N : Low asserting reset for WLAN core.
* WLAN_HOST_WAKEUP : WL_HOST_WAKEUP signal output.

3.12.1.4.2 BT

* BT_UART_RXD : Bluetooth UART Serial Input.
* BT_UART_RTS : Bluetooth UART Request to Send. Active-low request.
* BT_UART_CTS : Bluetooth UART Clear to Send. Active-low clear.
* BT_UART_TXD : Bluetooth UART Serial Output.
* BT_PCM_CLK : BT PCM clock, can be PCM-master (output) or PCM-slave (input).
* BT_PCM_DIN : BT PCM data input.
* BT_PCM_SYNC : BT PCM sync signal, can be PCM-master (output) or PCM-slave (input).
* BT_PCM_OUT : BT PCM data output.
* BT_WAKEUP : BT Wakeup Input.
* BT_HOST_WAKEUP : BT Host Wakeup Output
* BT_RESET_N : Low asserting reset for BT core.

3.12.1.4.3 FM Radio

* FM_ANT : FM RF input.
* SLEEP CLK : External reference oscillator input. (32.768KHz)
* FM_R : Right audio line output – digital input data.
* FM_L : Left audio line output – digital frame synchronization.
* BT_PCMS : Also Using Control of FM Radio

3.12.1.4.4 Common

* WLAN_REG_ON : If low the internal regulators will be disabled.
* SLEEP_CLK : LPO clock (32.768kHz) input. Used for low-power mode timing.
* CLK_IN : Crystal amplifier input or frequency reference input.
* CLK_REQ : Crystal Circuit / Reference Clock Enable (active-high)

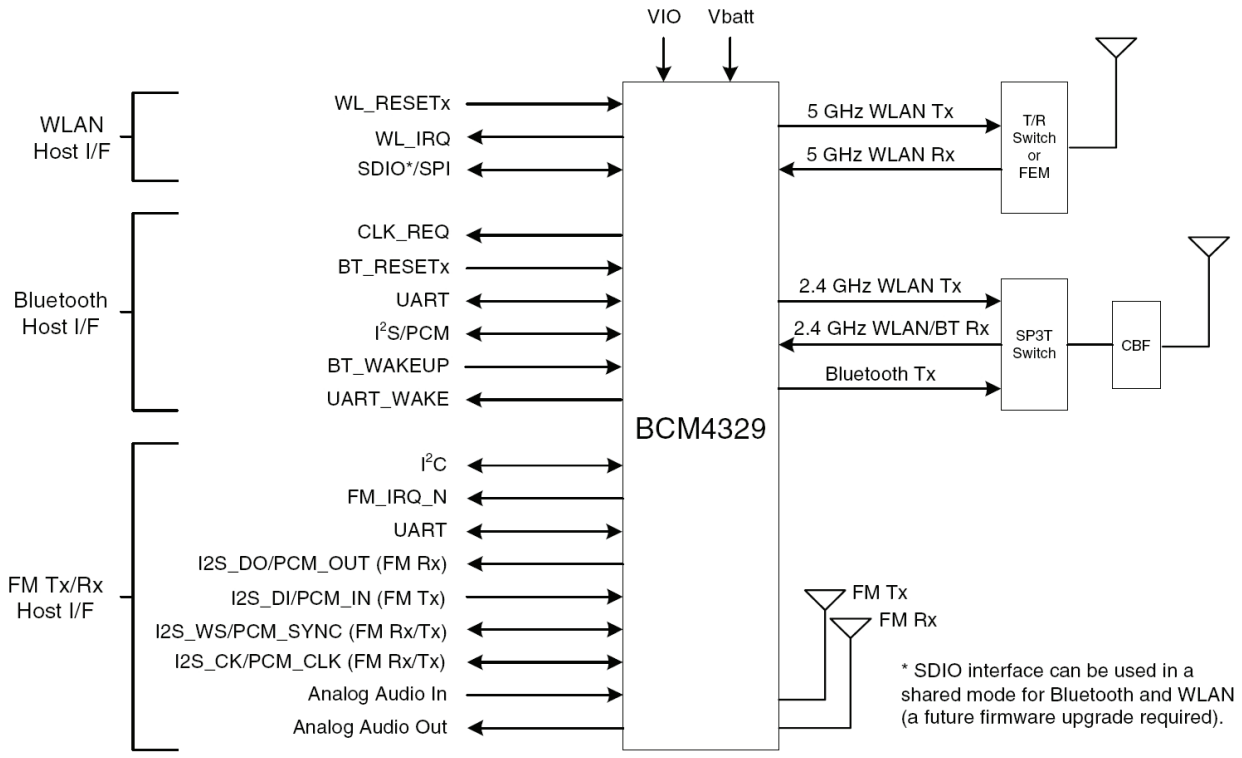


Figure. Wifi/BT/FM Interface Block Diagram

3.12.1.5 BCM4751 (GPS module)

- GPS_UART_RXD : Host UART transport data receive
- GPS_UART_TXD : Host UART transport data transmit. (100K pull-up is needed)
- GPS_UART_CTS_N : UART clear to send
- GPS_UART_RTS_N : UART request to send
- 26MHz_GPS_REF : Calibration clock

_ GPS_26MHz : 26MHz TCXO input

_ CLK32K_TWL : Sleep clock

- GPS_GSM_CTL : Transmit blanking signal

_ GPS_RESET_N : Reset

- GPS PWR_ON : Used as a control signal for enabling Deep Sleep mode.

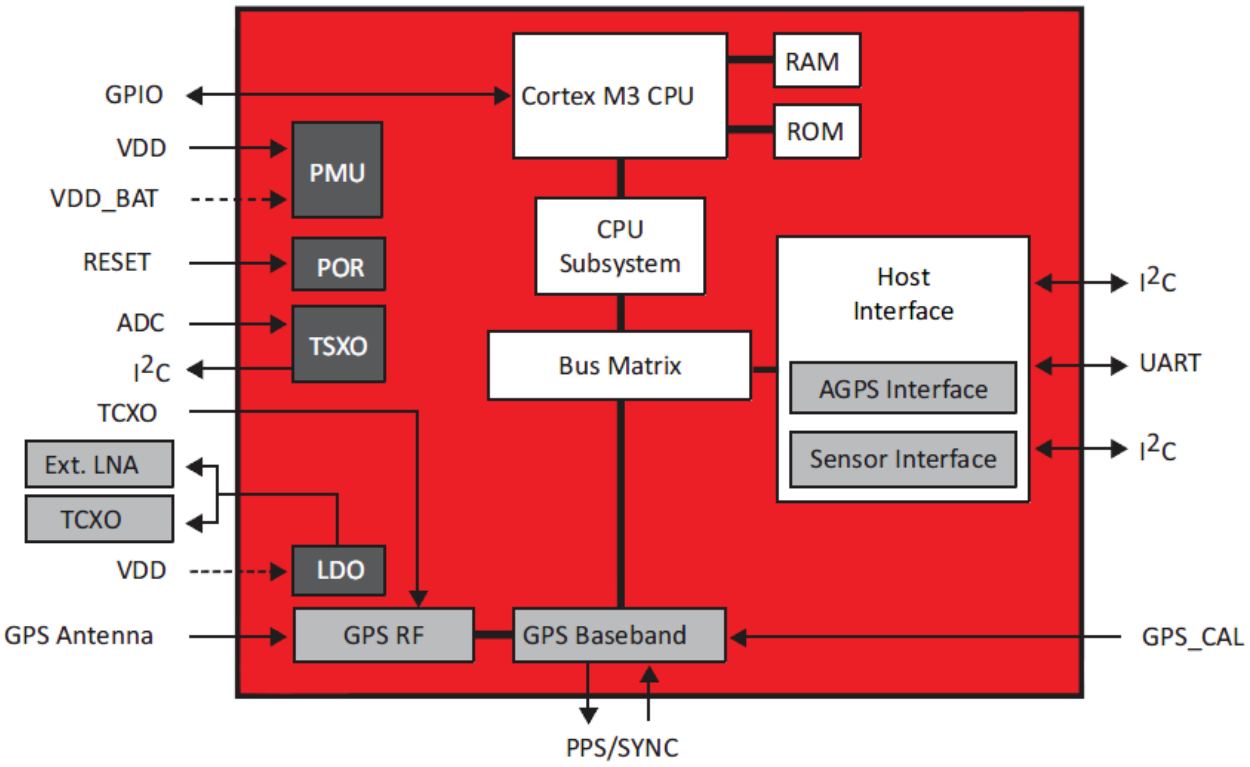
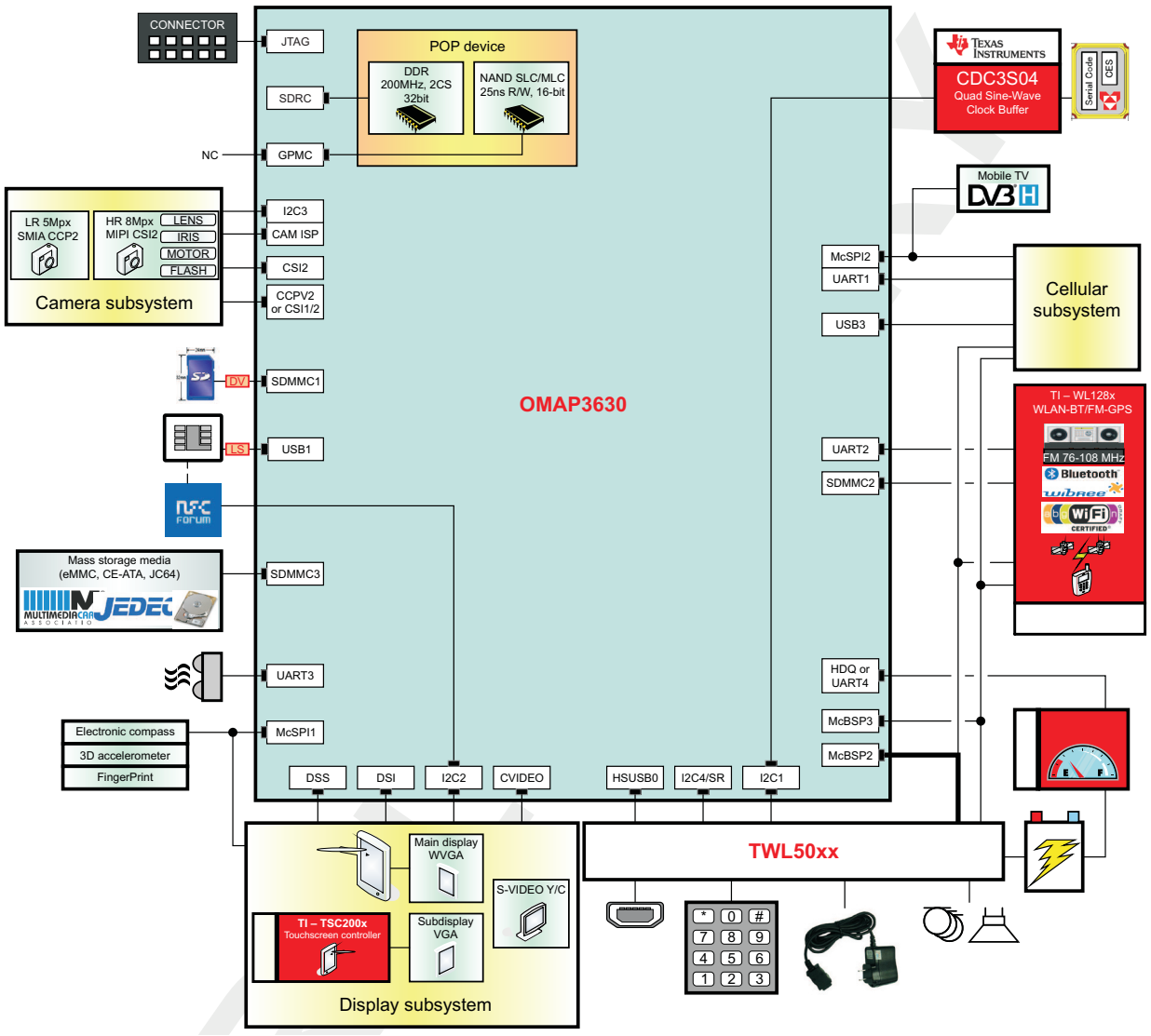


Figure. GPS Interface Block Diagram

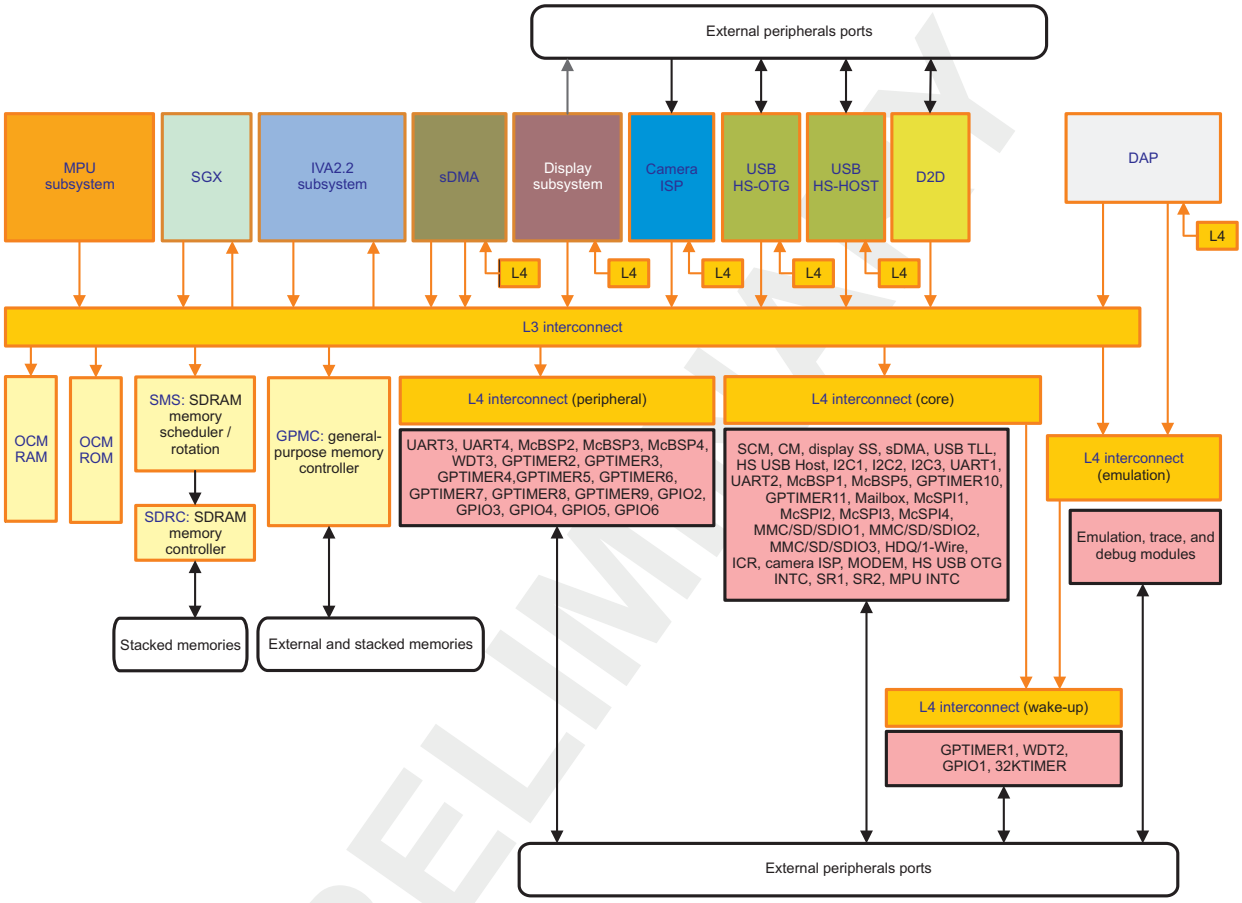
3.12.2 OMAP Sub System

3.12.2.1 OMAP environment



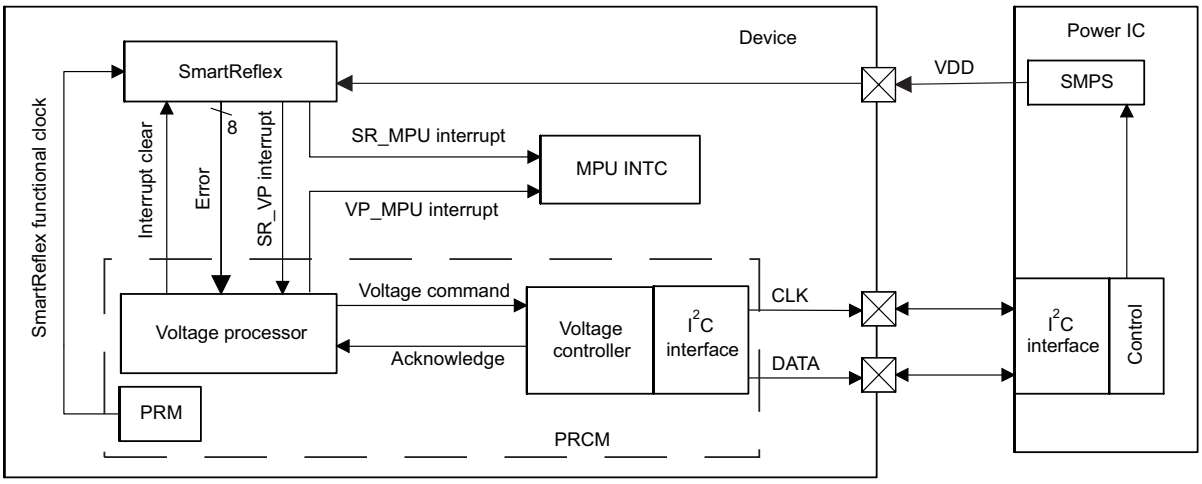
3.12.2.2 Memory

Micro processor unit has a 32 bit address port , allowing it to handle a 4 GB space divided into several regions.
The Memory map is composed of a memory space and dedicated space Interconnect of the devices and the main modules and subsystems in the platform.



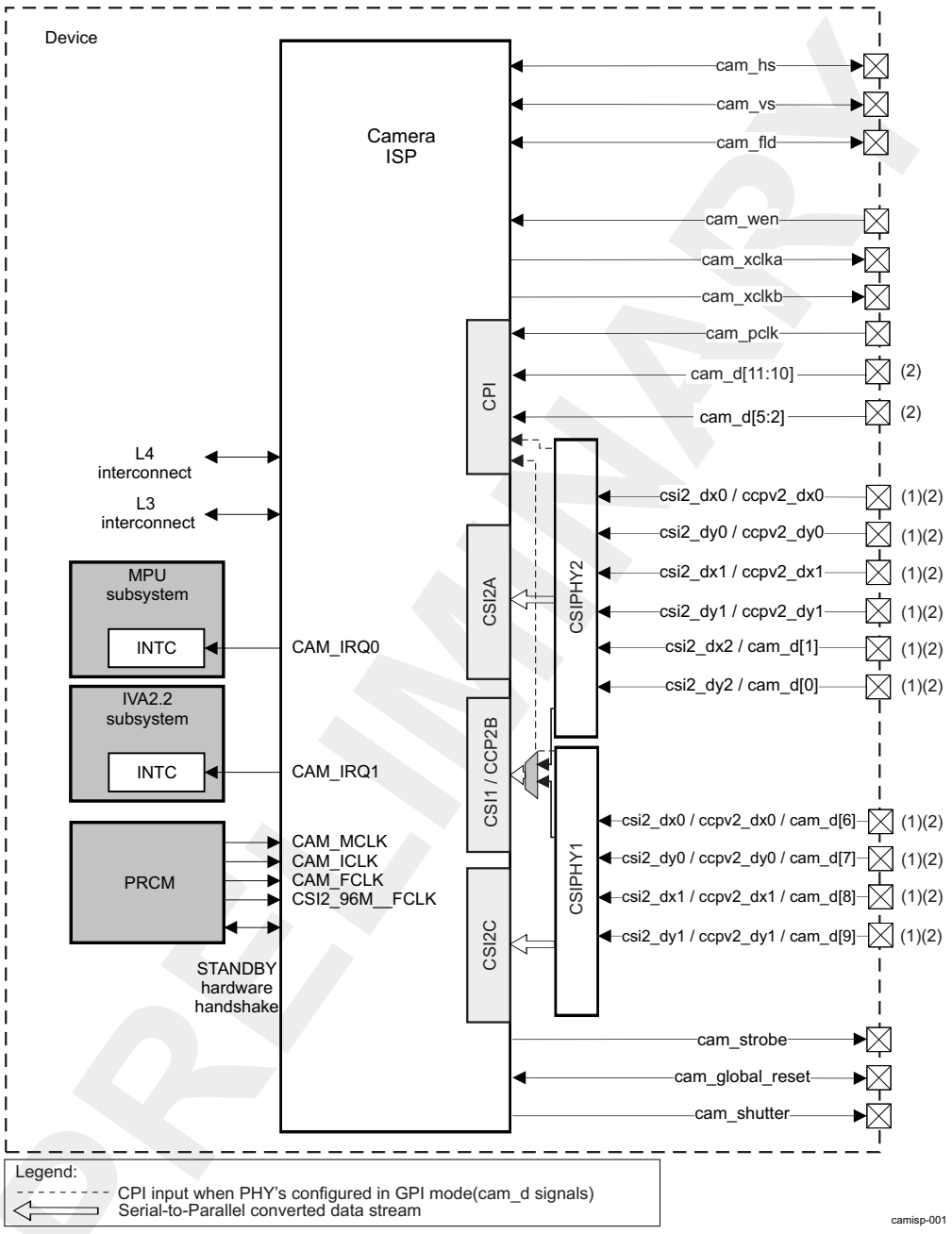
3.12.2.3 Power Management

SmarReflex is a power management technique for controlling the operating voltage of a device to reduce its active power consumption.



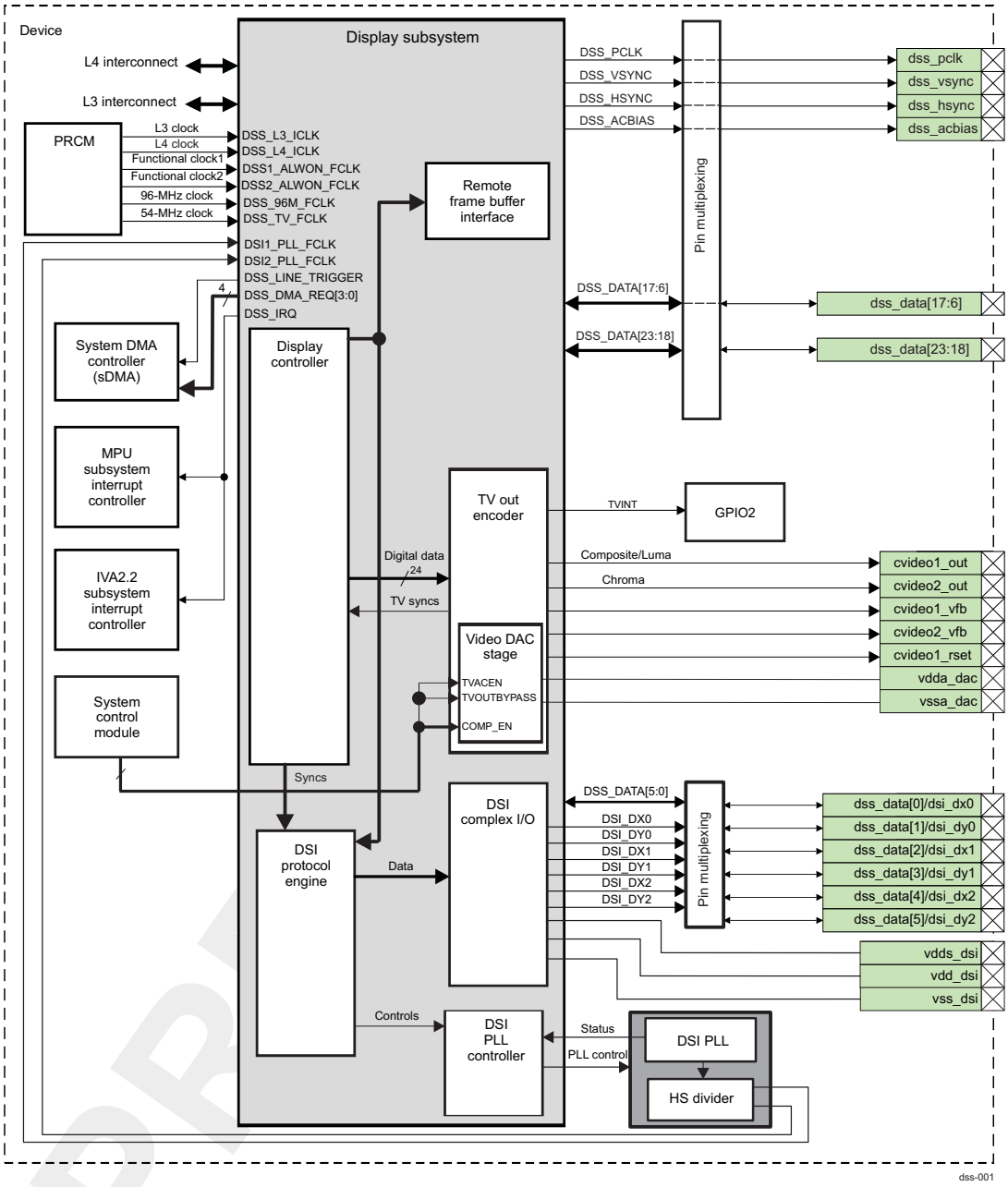
3.12.2.4 Camera ISP

The camera ISP is a key component for imaging and video applications such as video preview, video record , and still image capture with or without digital zooming.



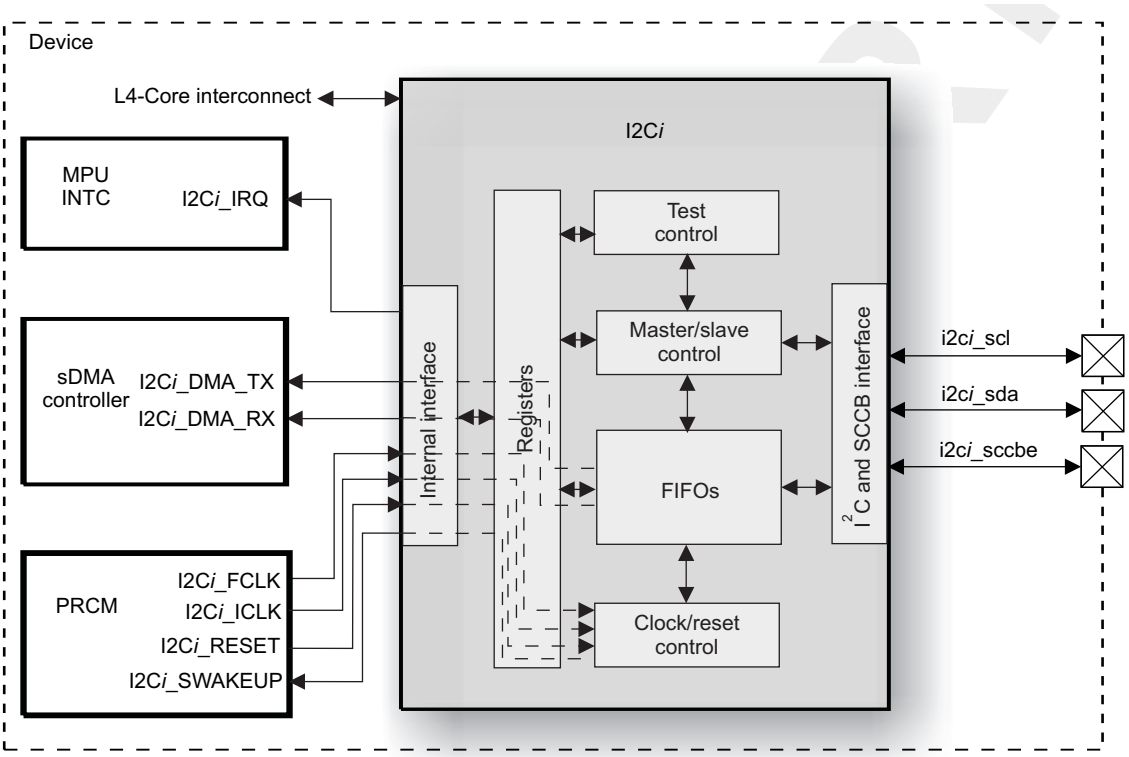
3.12.2.5 Display

The display subsystem provides the logic to display a video frame from the memory frame buffer on a liquid crystal display panel or TV set.



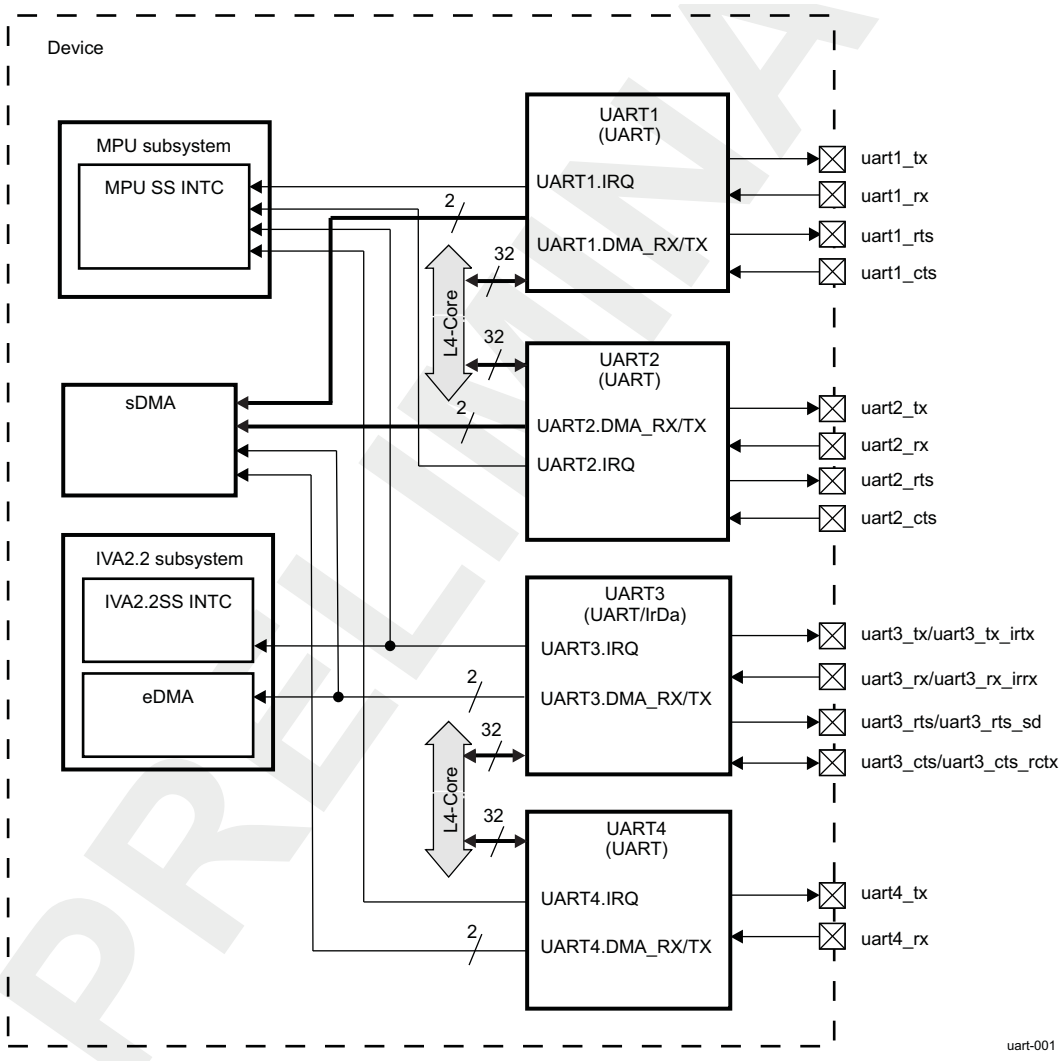
3.12.2.6 I2C

The device contains four multimaster high speed inter integrated circuit controllers.



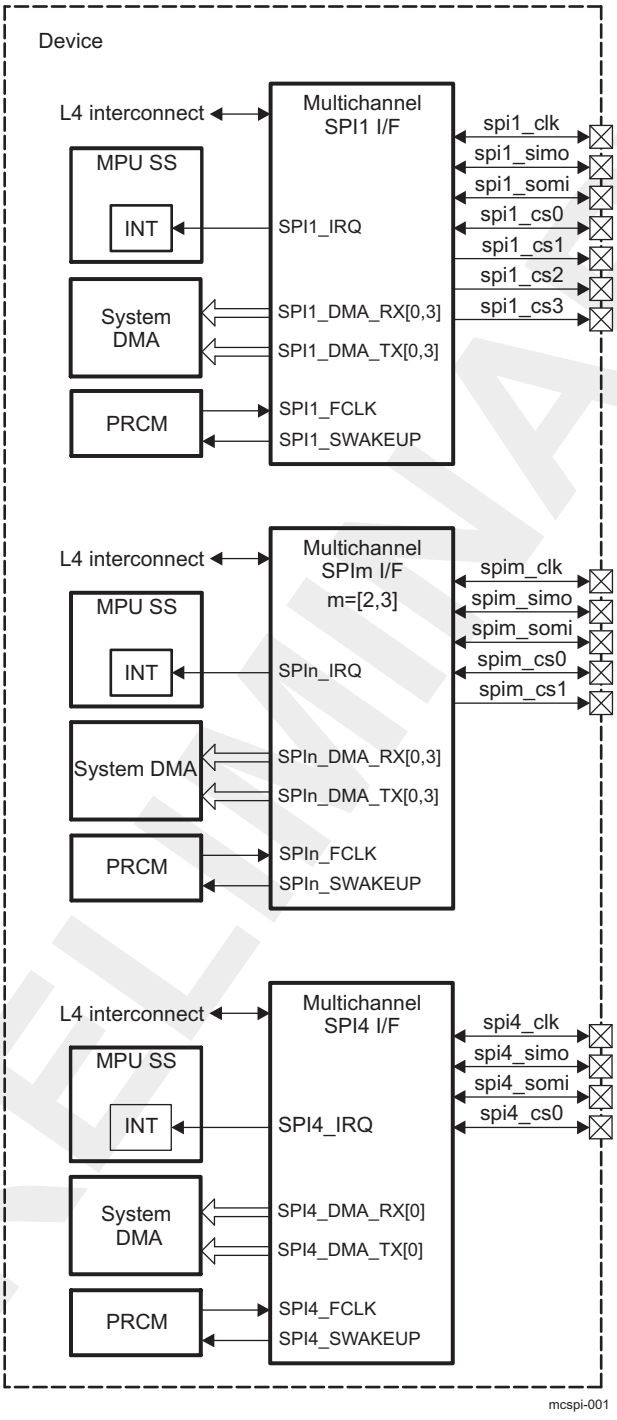
3.12.2.7 UART

The device contains three universal asynchronous receiver/transmitter devices.



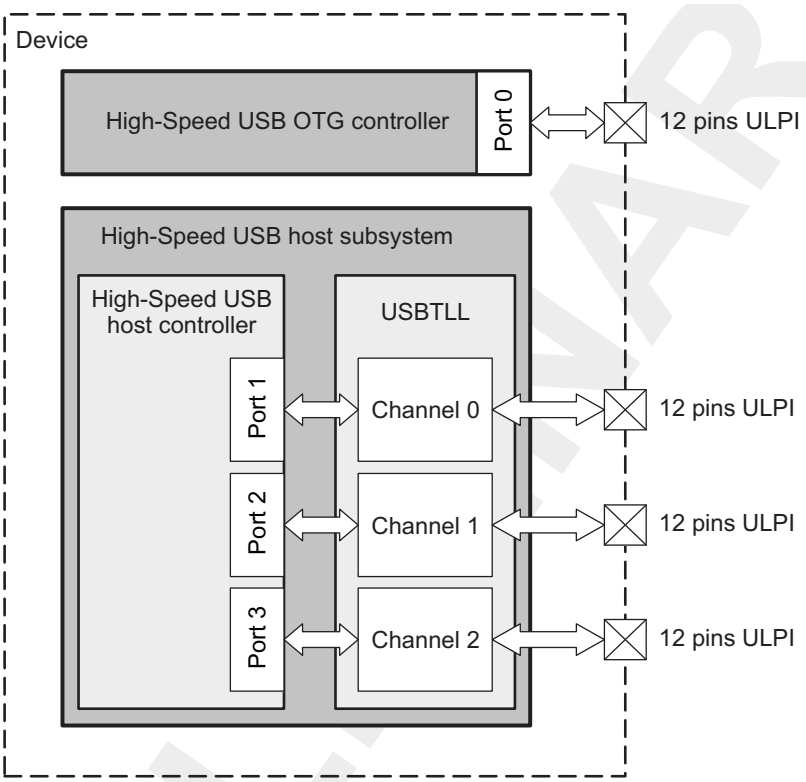
3.12.2.8 McSPI

The multichannel serial port interface is a master/slave synchronous serial bus.



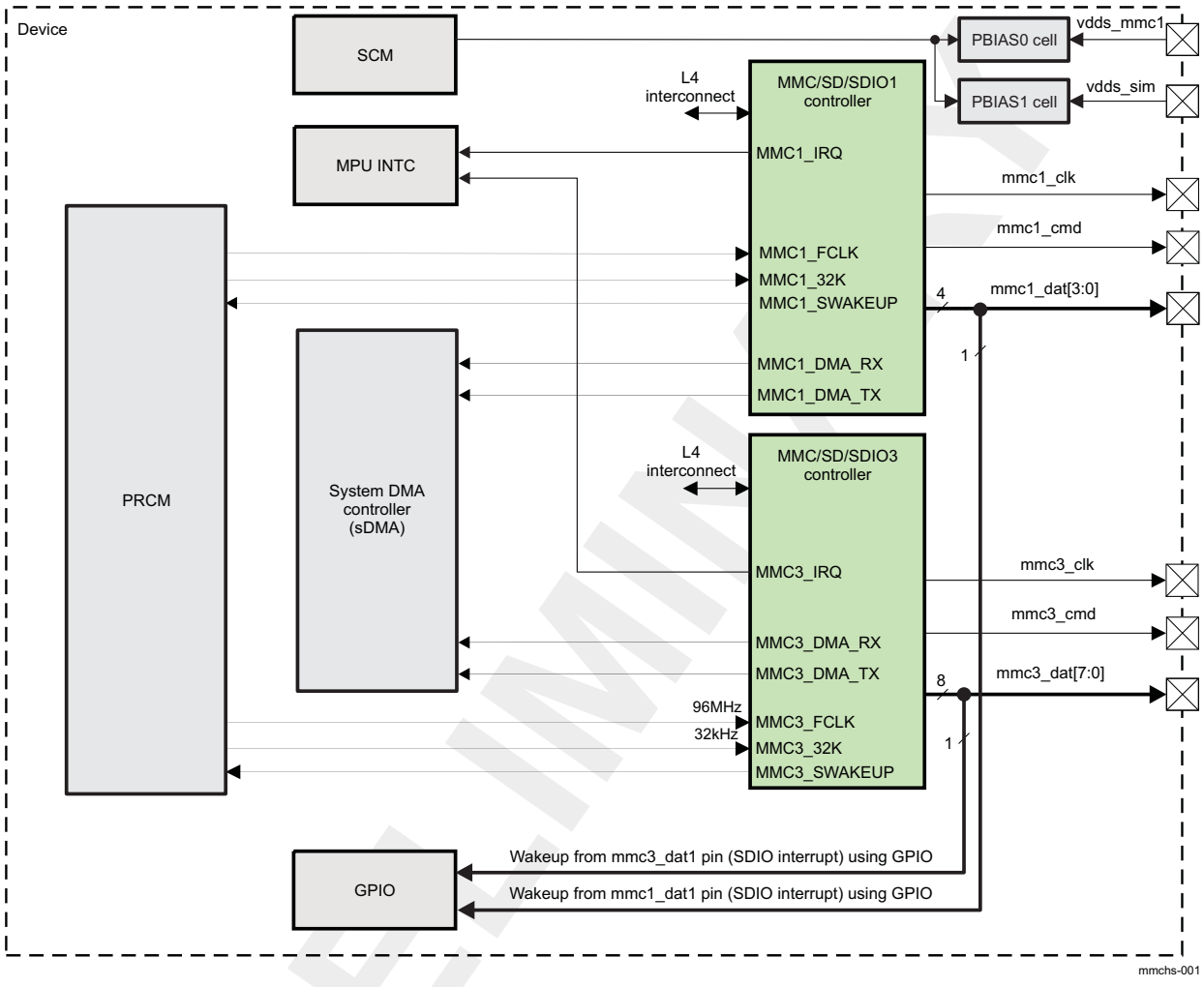
3.12.2.9 USB

The device contains two USB modules (HS USB OTG controller / HS USB host subsystem).



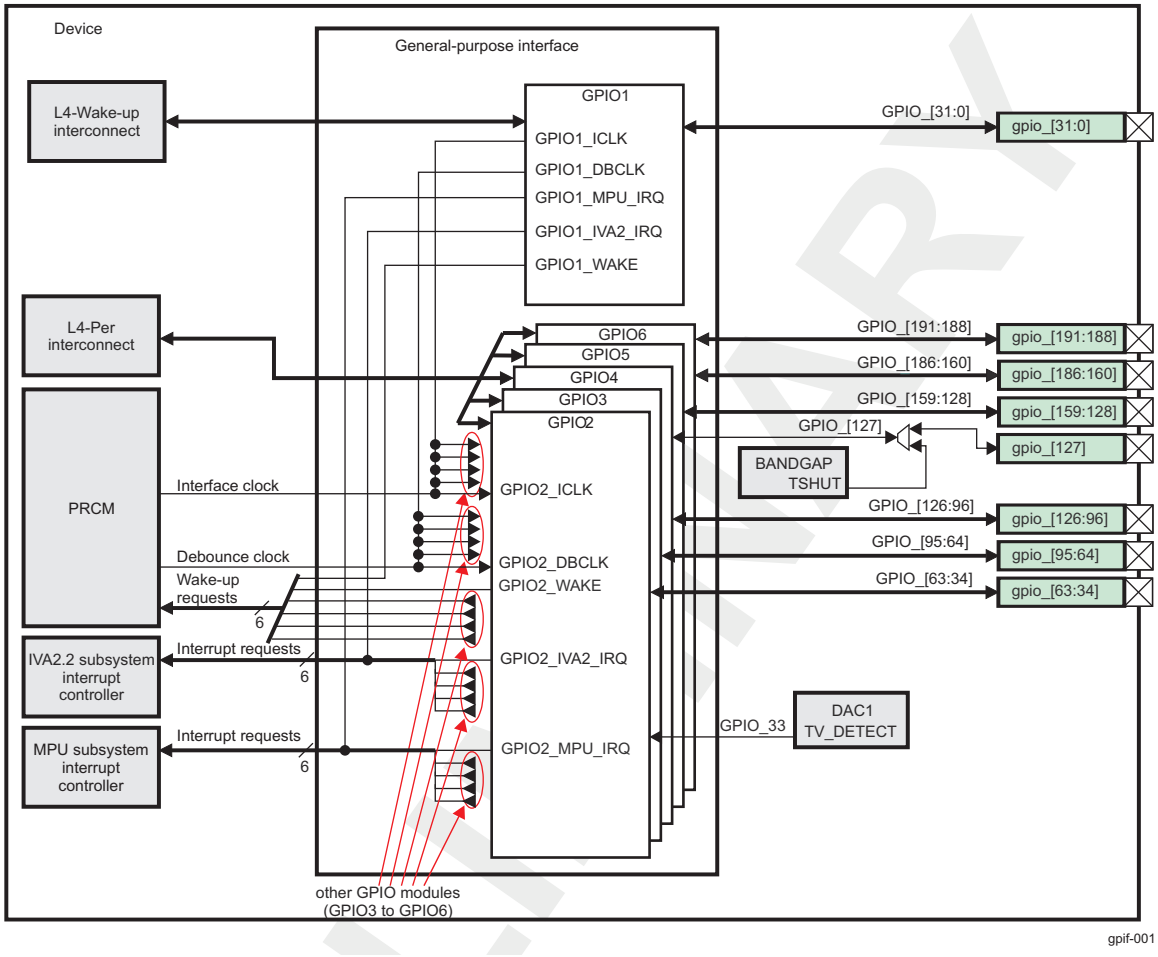
3.12.2.10 MMC/SD/SDIO

The Multimedia card high speed/ SD /SDIO(MMC/SD/SDIO) host controller provides an interface between a local host such as a microprocessor unit or digital signal processor and either MMC, SD memory cards or SDIO cards and handles MMC/SD/SDIO transactions with minimal local host intervention.



3.12.2.10 General Purpose IO

The general-purpose interface combines six general purpose IO banks Each GPIO module provides 32 dedicated general purpose pins with input and output capabilities thus, the general purpose interface supports up to 192 (6X32) pins.



3.13 Audio and sound

3.13.1 Overview of Audio path

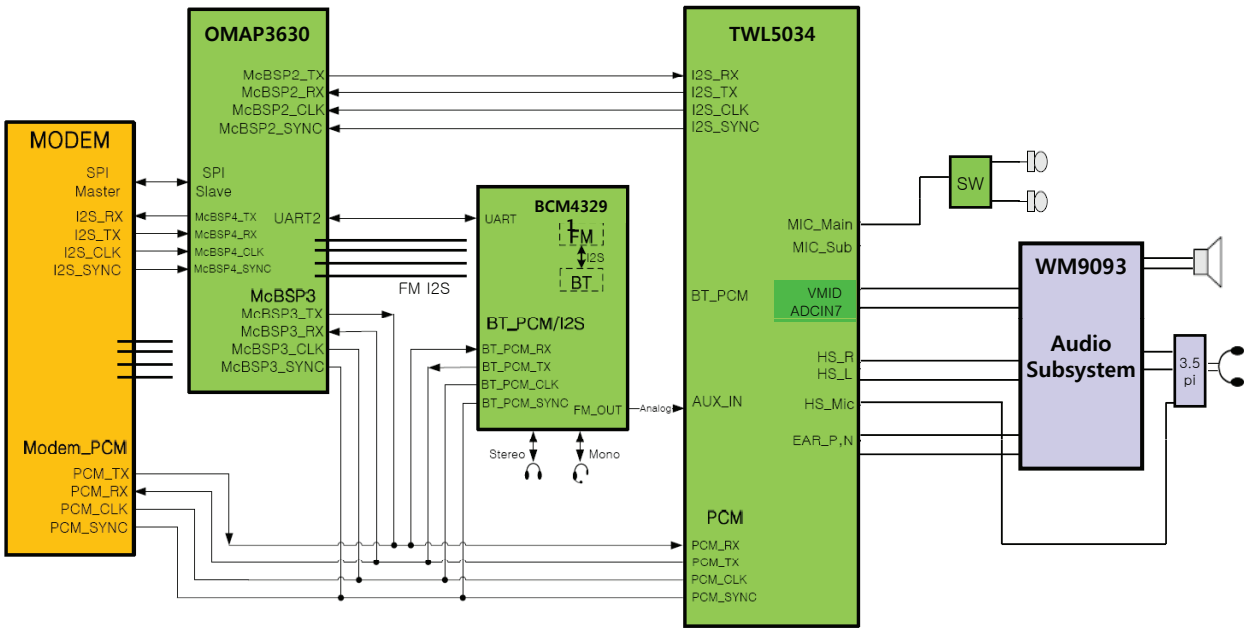


Figure. Block diagram of Audio & Sound path

3.13.2 Audio signal processing & interface

3.13.2.1 TWL5034 audio interface

The device audio module contains several audio analog inputs, outputs, and digital microphone inputs. It is connected to a multimedia processor through the TDM/codec interface (audio interface) and to a 3GPP Modem through a pulse-code modulation (PCM) interface (voice interface) and Bluetooth interface. The audio module is controlled by internal registers that can be accessed by the high-speed I_2C control interface.

- Feature List Overview

• Serial data ports:

– Two ports: Port 1 is a voice PCM interface; Port 2 is an audio inter-IC sound (I2S)/time-division multiplexing (TDM) interface.

– No support for McBSP dynamic slot

– Both ports are master/slave (In TDM mode, Port2 can act only as a master.)

– Tri-state capability on I2S/TDM and PCM

• Audio and voice channels:

– Voice channel with 8- or 16-kHz sampling modes on MCLK=26MHz

– Audio channel with 8-, 11.025-, 12-, 16-, 22.05-, 24-, 32-, 44.1-, or 48-kHz sampling modes, 96 kHz is supported on the RX path

– Audio phase-locked loop (PLL) supports 26-MHz, 19.2-MHz, or 38.4-MHz

– Carkit, analog loop mode

– Secondary microphone for noise cancellation

– Three analog microphone biases and two digital microphone biases

• Power and analog mixing

– Analog/digital mixing capability (path-mixing capability)

– 8-Ω stereo class D/class AB (16-Ω headset or 32-Ω earpiece) drivers

– Class D output power of 700 mW (8 Ω with VBAT = 4.0 V)

– Stereo with or without pseudo-ground headset driver

– Eight lines for the uplink path (four differential inputs). FM input is mono or stereo.

– Predrivers for external class D or piezoelectric speaker drivers (multiplexed on HS pseudo-ground output)

– Left/right paths switch on hands-free speaker and predriver for external class D amplifier.

– Differential H-bridge driver for Vibrator.

• Additional features

– Headset detect capability (GPIO)

– Digital microphone inputs (four microphone inputs, two clocks, and two supplies for two external digital microphones). Supplies are the microphone biases referred to in the previous sublist. Data and clock are multiplexed on the PCM port.

– Pop-noise reduction circuitry for all paths

– Side-tone function for the voice paths

– Data scramble function for I2S data received

– Bass boost functions in one stereo audio RX path

– Automatic gain control on the microphone paths

– Independent gains on UL paths

– Programmable gain amplifier on audio RX and TX

– Wide gain programmable range on the microphone input

– DTMF tone generator

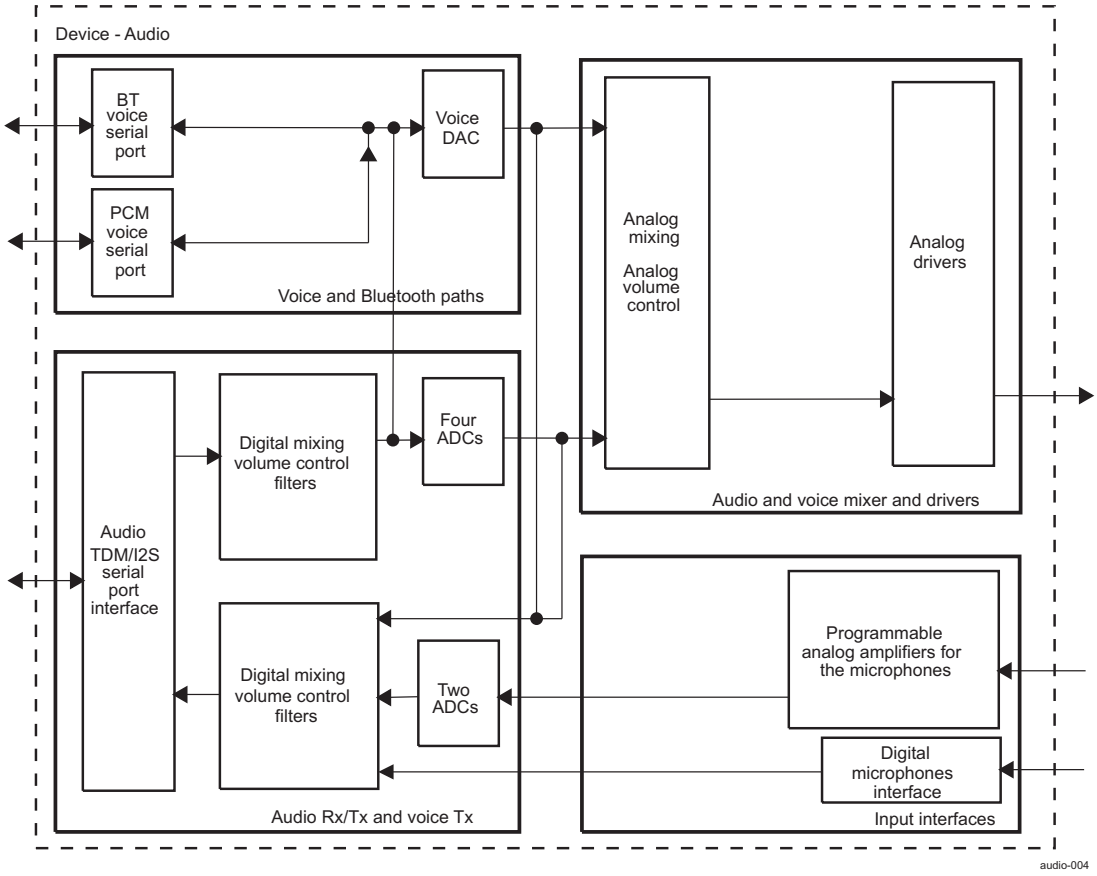


Figure . Device Audio Subsystem Architectural Overview

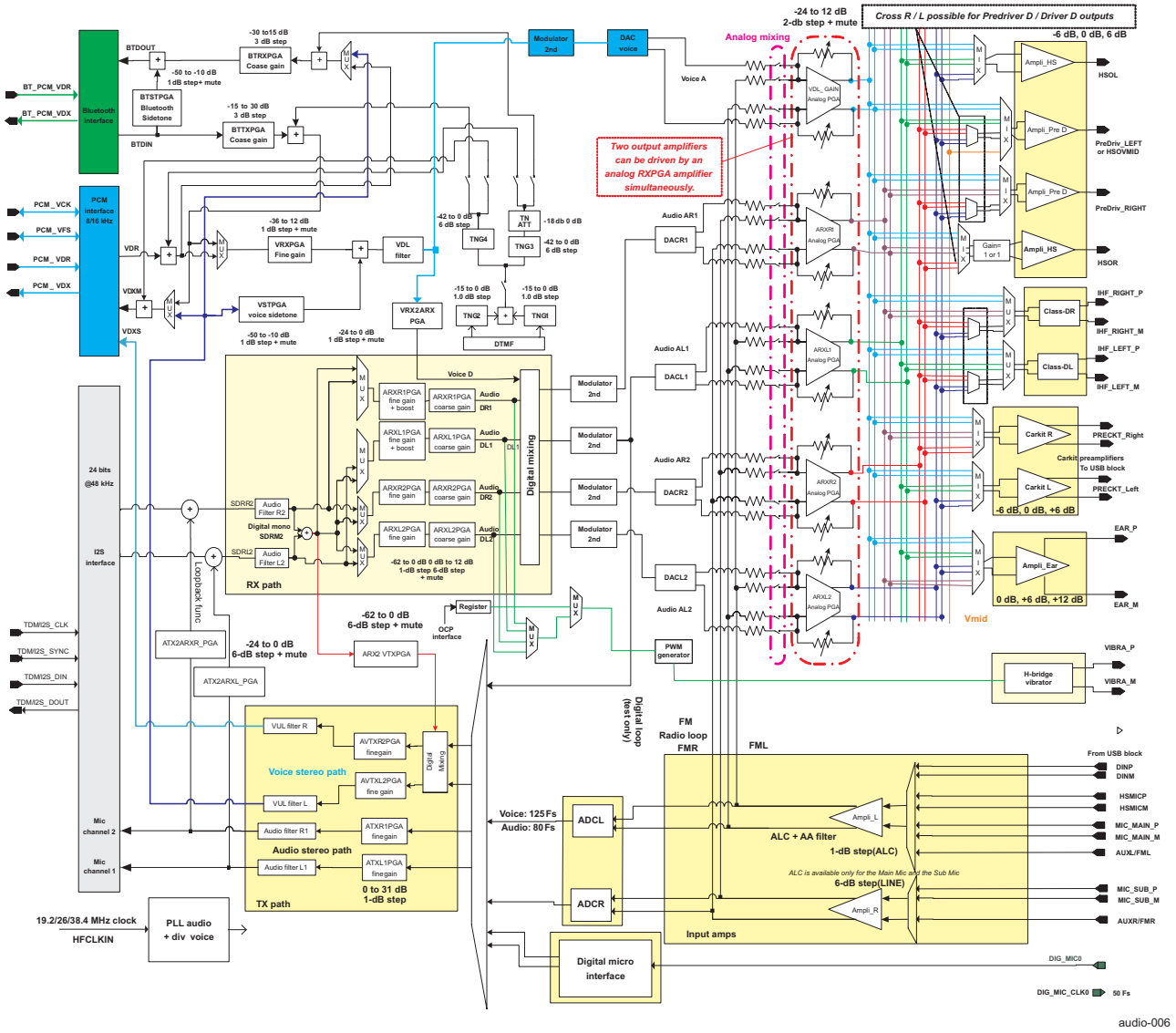


Figure. Detailed diagram of TWL5034 audio interface

3.13.2.2 WM9093 audio interface

The WM9093 is a high performance low power audio subsystem, including headphone driver and Class AB/D earpiece/speaker driver. The Class D speaker driver support 650mV output power at 3.6V, 1%THD.

The unique dual mode charge pump architecture provides ground referenced headphone outputs removing the requirement for external coupling capacitors. Class G technology is integrated to increase the efficiency and extend playback time by optimizing the headphone driver supply voltages according to the volume control.

The flexible input configuration allows single ended or differential stereo inputs. Mixers allow highly flexible routing to the outputs, A 'voice Bypass' path is also available for low-power voice applications.

The WM9093 is controlled using a two-wire I2C interface. An integrated oscillator generates all internal clocks. Removing the need to provide any external clock.

Separate mixer and volume controls are provided for each headphone and speaker driver. Automatic Gain control limits the speaker output signal in order to prevent clipping. DC offset correction to less than 1mV Guarantees a pop/click-free headphone start up.

The WM9093 is available in a 2.0mm × 2.5mm 20-bump CSP package.

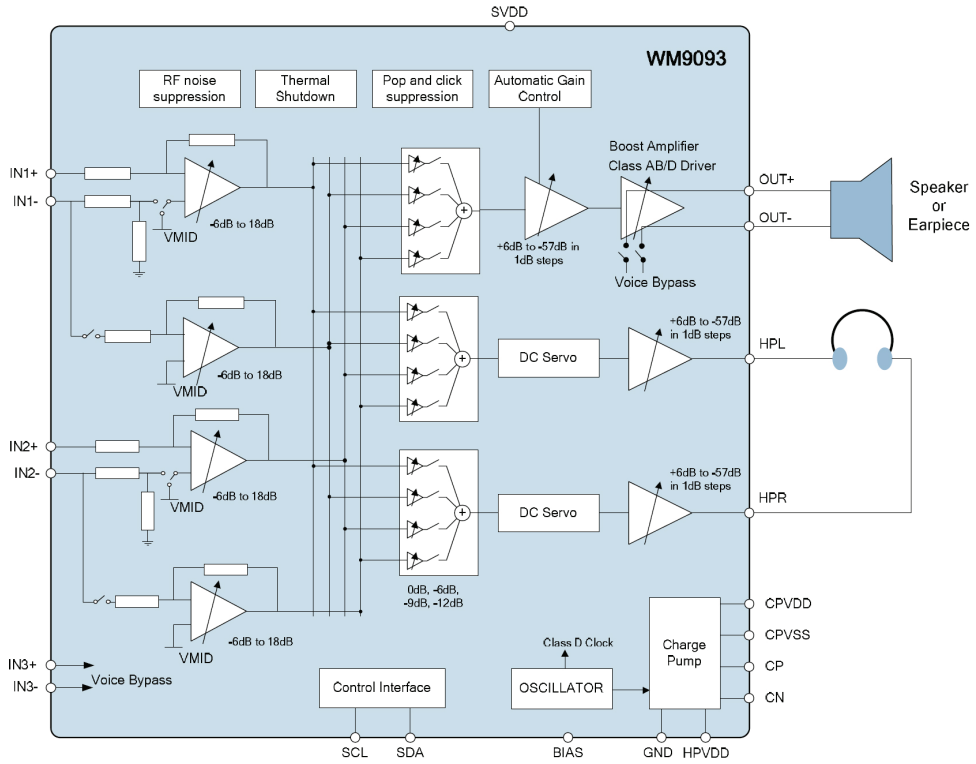
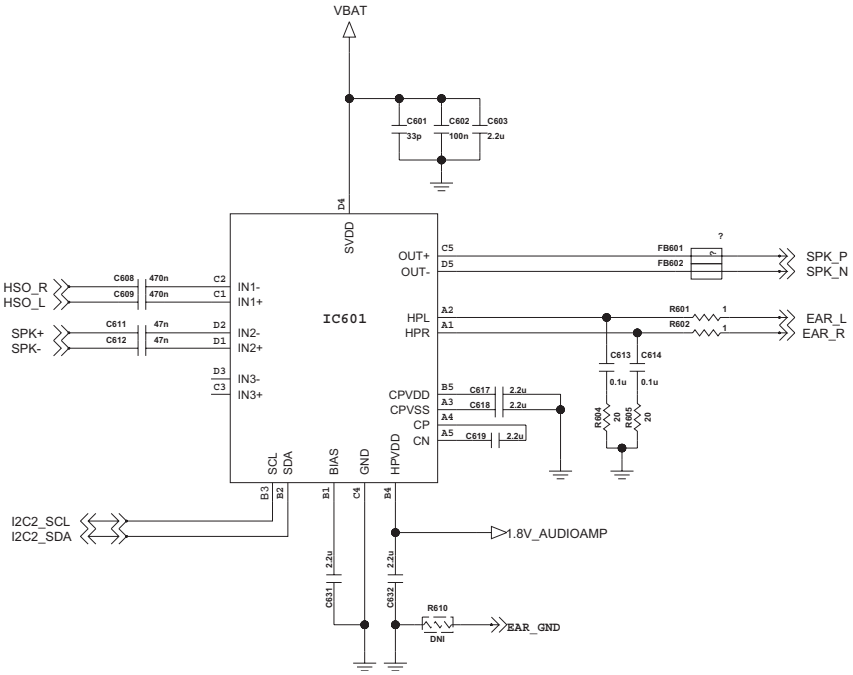
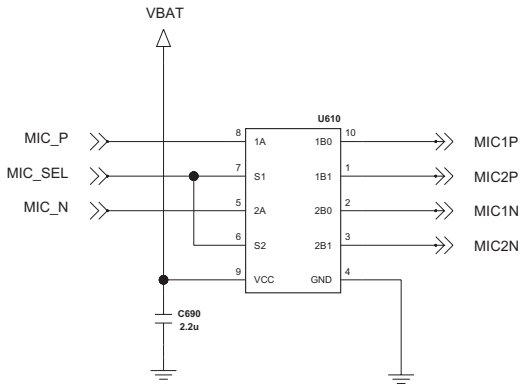


Figure. Detailed diagram of WM9093 audio interface

AUDIO SUBSYSTEM

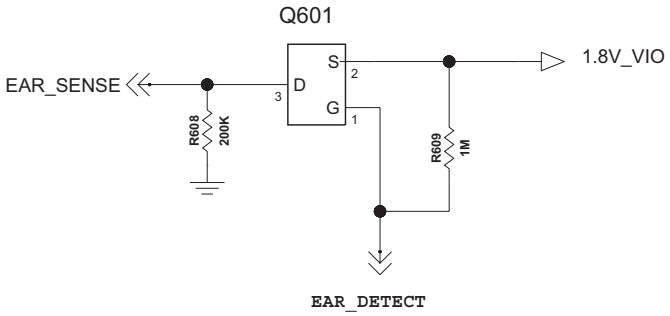


MIC Switch

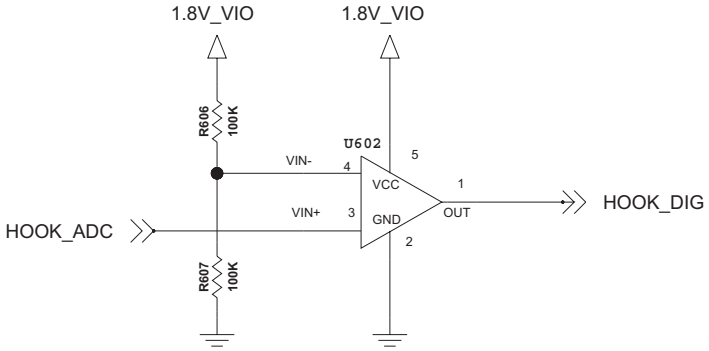


EAR DETECTION

(Close to Connector)



HOOK



3.14 Display

LCD module is connected to Main PCB with 30-pin connector.

The LCD is controlled by MDDI Interface in OMAP3630

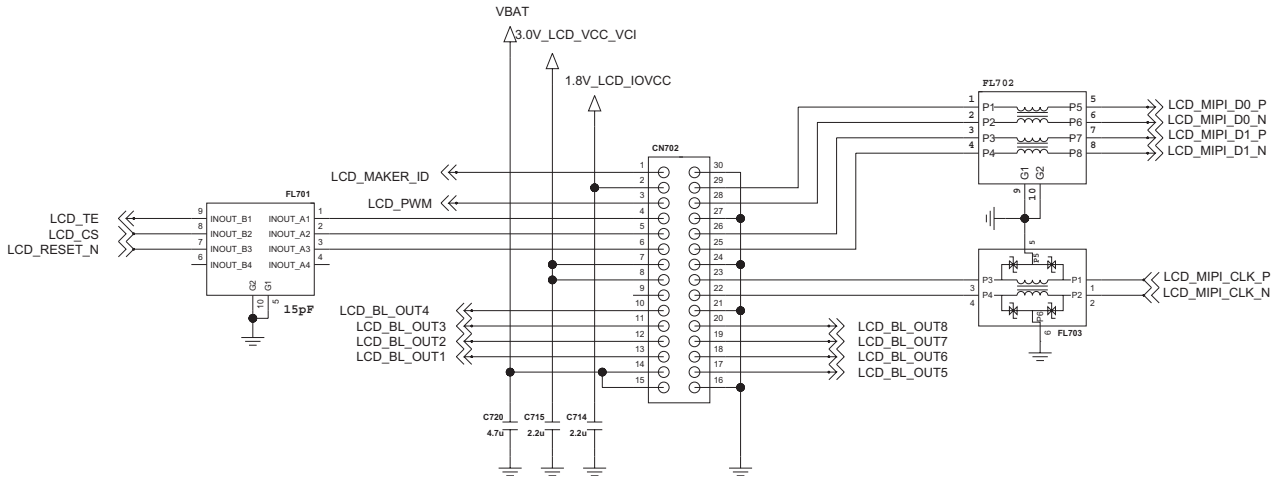


Figure. Schematic of LCD connector (Main Board)

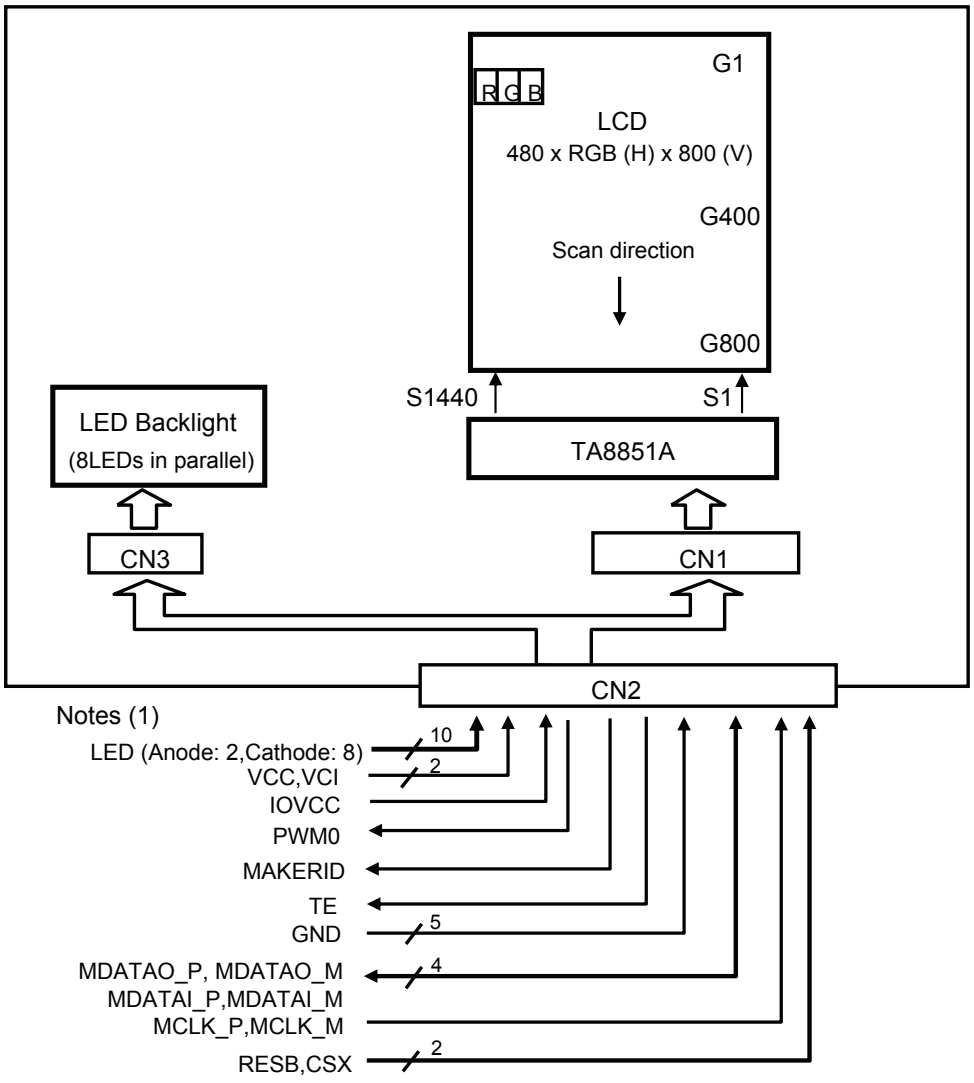
Pin No.	Signal	I/O	Function	Driver's Signal Name
1	MAKER_ID(Low)	O	Maker ID(Low; GND level)	-
2	IOVcc	-	IO Power (1.8V)	IOVCI
3	PWMO	O	PWM output pin of Active Back Light control processir	PWMO
4	TE	O	Tearing Effect output pin	TE
5	CSX	I	Chip Select pin Note(1)	CSX
6	RESB	I	Reset Input pin	RESB
7	Vci	-	Analog power supply for reference (2.8V)	SVCI
8	Vcc	-	Analog power supply for Analog Circuit (2.8V)	AVCI
9	NC	-	NC	-
10	LEDC_4	-	GND for LED	-
11	LEDC_3	-	GND for LED	-
12	LEDC_2	-	GND for LED	-
13	LEDC_1	-	GND for LED	-
14	LED_A	-	Power supply for LED	-
15	LED_A	-	Power supply for LED	-
16	GND	-	GND	-
17	LEDC_5	-	GND for LED	-
18	LEDC_6	-	GND for LED	-
19	LEDC_7	-	GND for LED	-
20	LEDC_8	-	GND for LED	-
21	GND	-	GND	-
22	MCLK_M	I	Negative MIPI Clock Input	MCLK_M
23	MCLK_P	I	Positive MIPI Clock Input	MCLK_P
24	GND	-	GND	-
25	MDATA1_M	I/O	Negative MIPI Data2 Input / Output	MDATA1_M
26	MDATA1_P	I/O	Positive MIPI Data2 Input / Output	MDATA1_P
27	GND	-	GND	-
28	MDATA0_M	I/O	Negative MIPI Data1 Input / Output	MDATA0_M
29	MDATA0_P	I/O	Positive MIPI Data1 Input / Output	MDATA0_P
30	GND	-	GND	-

Table. Interface between LCD Module and MAIN Board

1	Part Name	TX10D10VM0EAA
2	Module Dimensions	55.54 (W)mm x 95.8 (H)mm x 1.45 (T)mm (Excluding I/F-FPC and electronic components)
3	Active Area Dimensions	51.84 (W)mm x 86.4 (H)mm
4	Pixel pitch	0.108 (W)mm x 0.108(H)mm
5	Resolution	480 x3 (R,G,B) (W) x 800(H) dots
6	Color Pixel Arrangement	RGB Vertical Stripe
7	Display Mode	Transmissive Type, Normally Black Mode, In-Plane Switching Mode
8	Number of Colors	16,777,216 Colors / 262,144 Colors
9	Viewing Direction	-
10	Backlight	Light Emitting Diode (LED), 8 LEDs are parallel connection Backlight current: 20mA / LED (typ)
11	Weight	12.6g(typ)
12	Power supply Voltage	Vcc=2.8+/-0.1V, Vci=2.8+/-0.1V
13	Interface I/O power supply Note(1)	IOVcc=1.8+/-0.1V The same voltage as "H" level of a customer's interface signal must be supplied to IOVcc.
14	LCD Driver IC	D51E6TA8851A (Source and Power IC: MagnaChip Semiconductor)
15	Interface	MIPI-DSI Command mode (2-Lane)

Note(1): IOVcc is the reference voltage for adjusting the I/O signal level of TA8851A.
IOVcc voltage must be determined according to a customer's system.

Table. LCD Module general data



Notes (1) Please connect the resistor (R=200 ohm) for current control between LED (cathode) and GND in the customer's system.

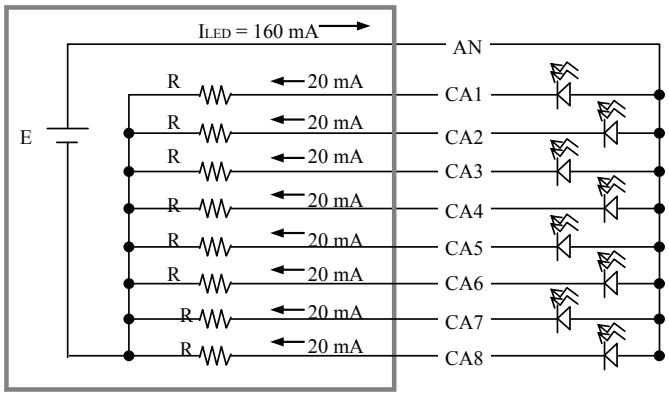


Table. LCD Module block diagram

3.15 Main (5M pixels) & Sub (2M pixels) Camera

LG-P970 supports two cameras. One is 5M pixels, main camera, the other is 2M pixels, sub camera used VT & self camera scene.

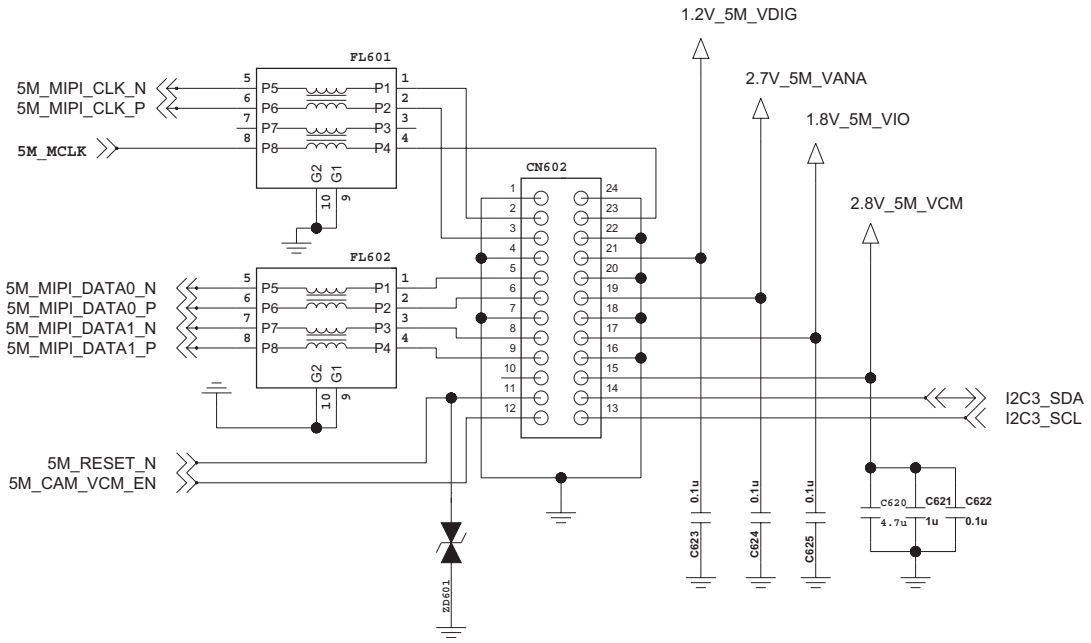
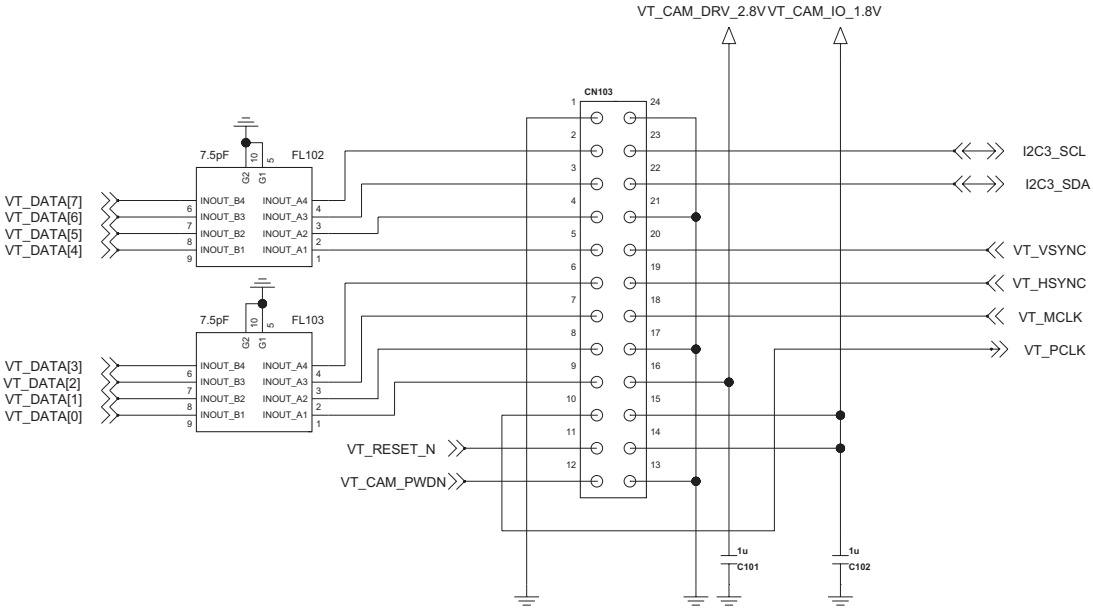


Figure. Main 8M Camera Schematic



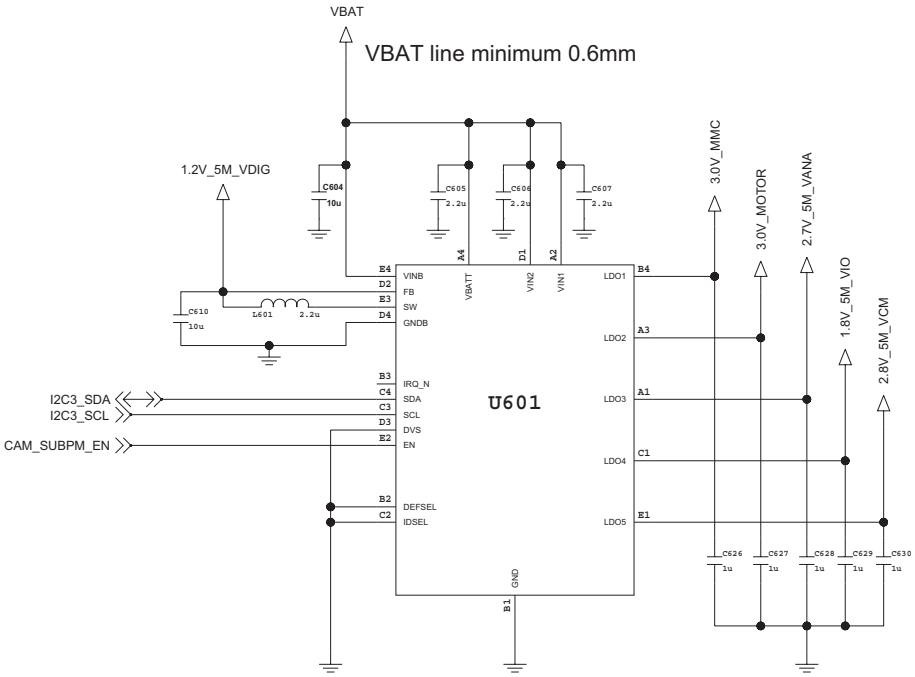


Figure. 5M Camera PMIC Schematic

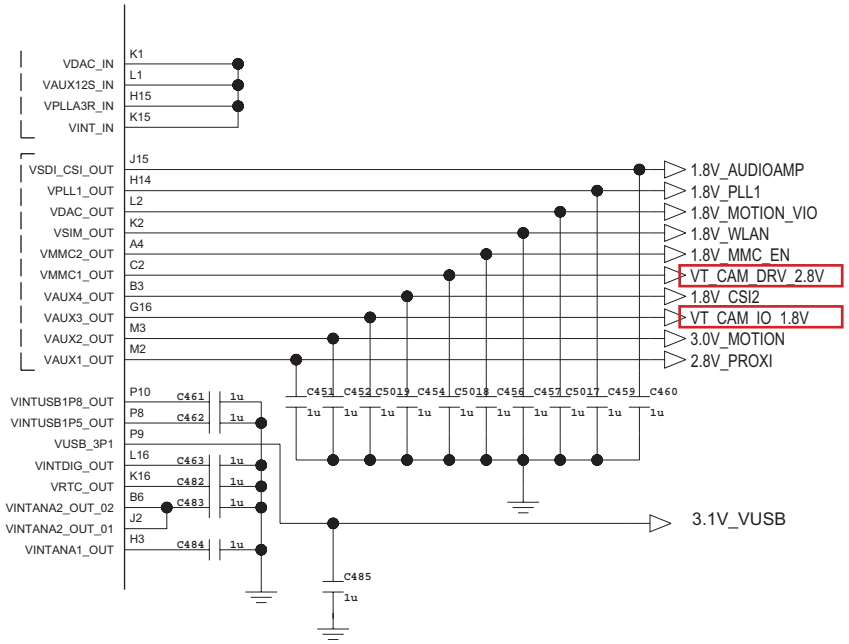


Figure. 5M Camera PMIC Schematic

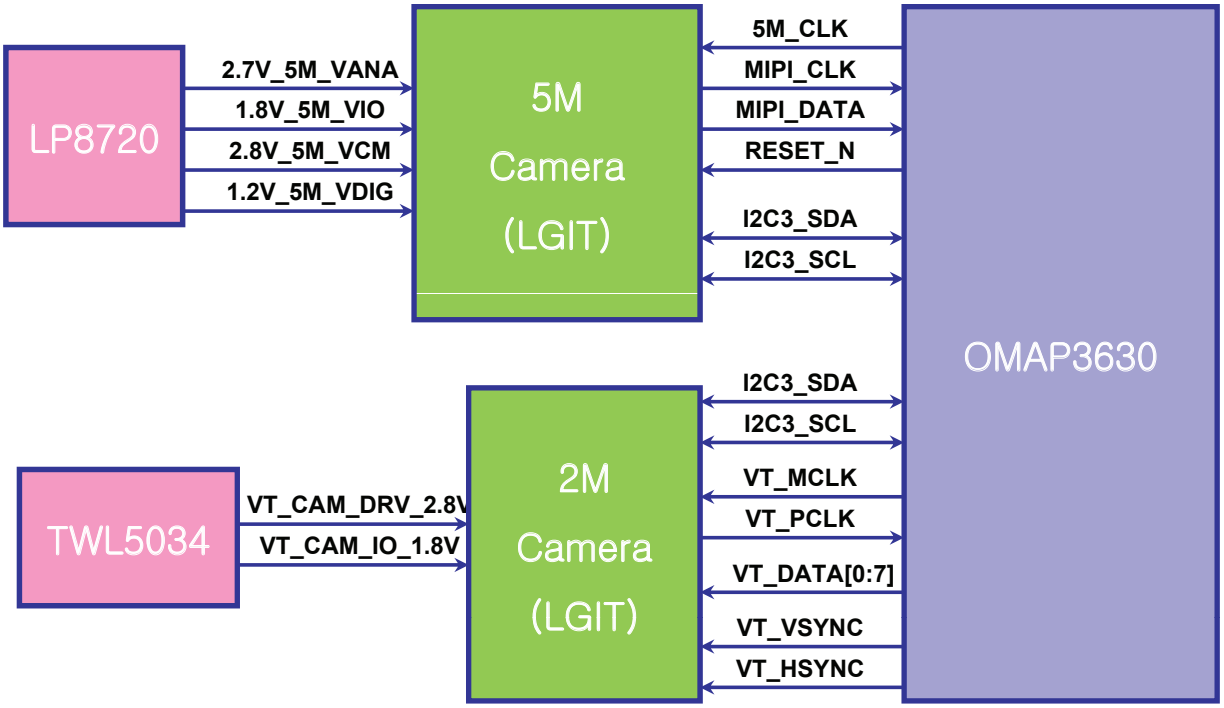


Figure. Camera Block diagram

3.16 Vibrator

The ERM motor, also distinguished as 'Q-coin Motor' creates a certain kind of vibration controlled and defined uniquely by LG Electronics. The followings are the certain examples of conditions that the users may feel the vibration from the phone: Incoming Call (in Silence Mode), Google Keys Pressed, Turn-on / -off, Dialing, and Text Messaging.

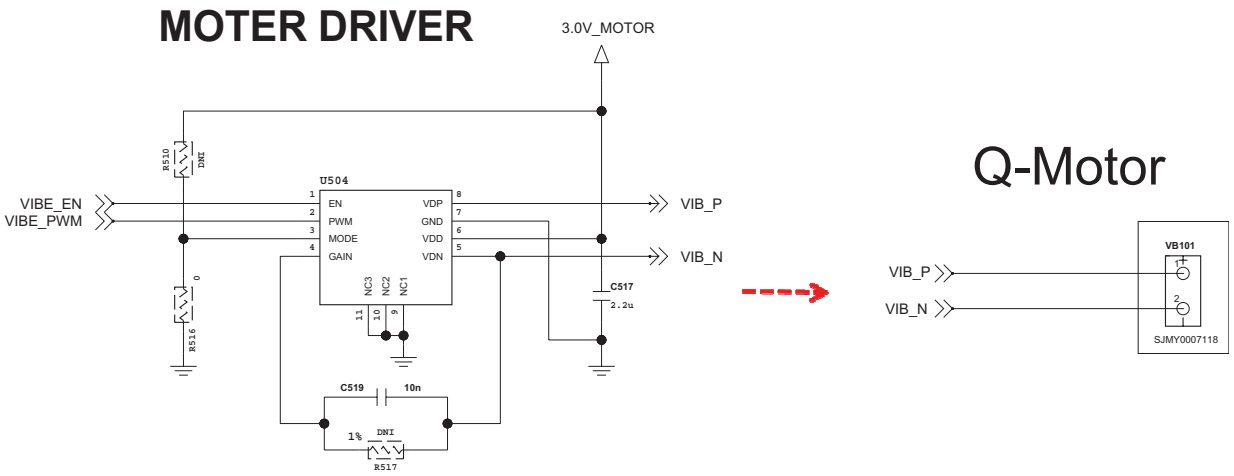


Figure 1 Vibrator Schematic

3.17 Compass Sensor

If a customer buy the application SW, The Sensor provides user with a Electric Compass function.

U105 (AK8975C, SUB-FPCB) IC is interfaced to OMAP3630(U301) using I2C interface.

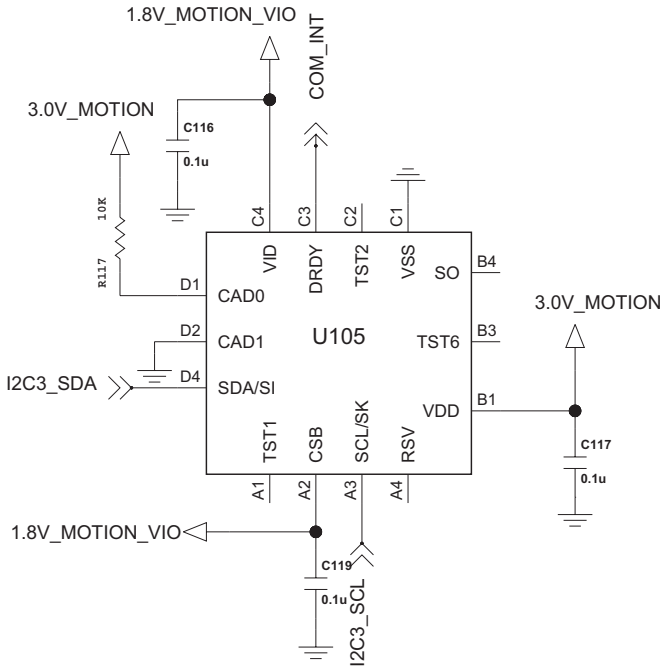
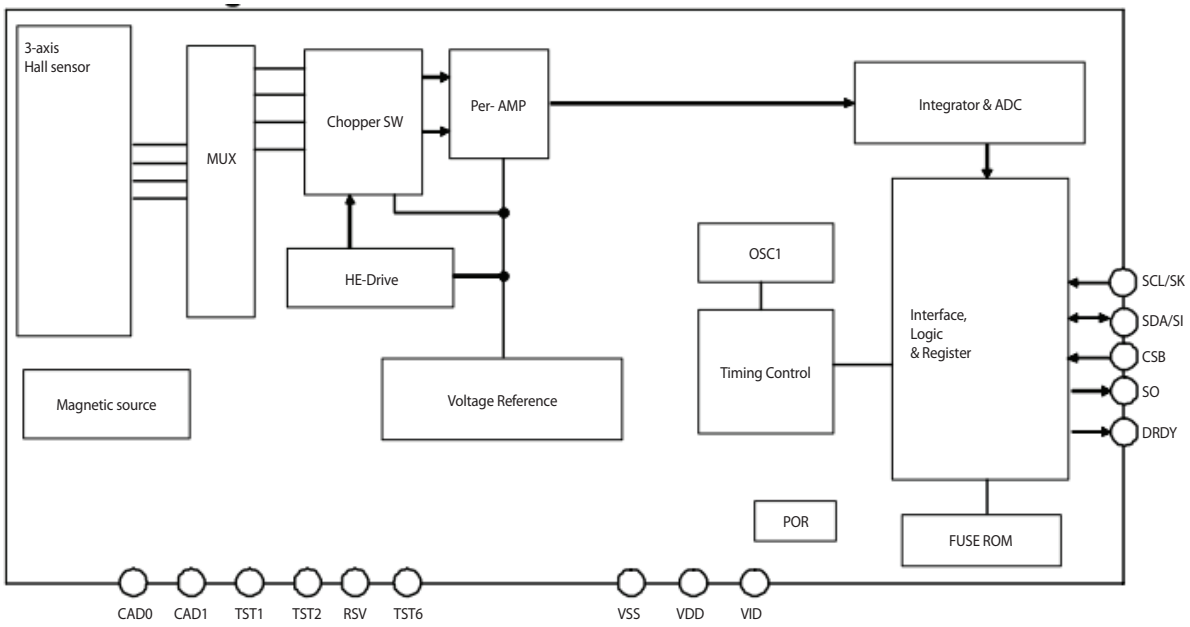


Figure. Compass Sensor Schematic



3.18 Motion Sensor

The motion sensor can sense gravity & accelerated motion. Therefore according to the direction of cell phone, the phone screen is rotated automatically. And the motion sensor is connected with a gyro sensor to supplement each data.

U104(SUB_FPCB) : KXTF9 IC is interfaced to OMAP3630(U301) using I2C interface.

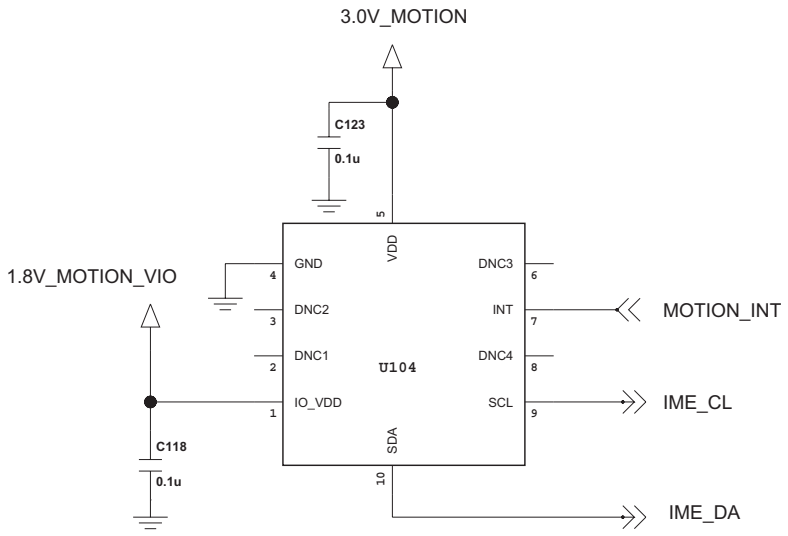


Figure. Motion Sensor Schematic

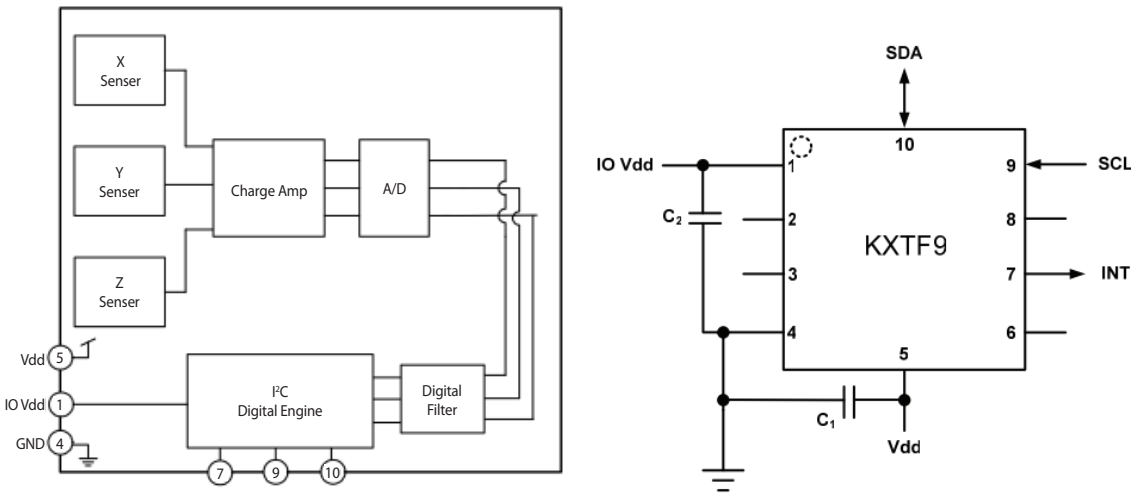


Figure. Motion Sensor Block Diagram

3.19 Gyro Sensor

The gyro sensor(MPU3050) can sense angular velocity not gravity and accelerated motion. The gyro sensor applied in LG- P970 can detect 3-axis rotation force sensing X,Y and Z angular velocity. And the gyro sensor data is supplemented by the motion sensor data. It make possible user to development application SW using gyro sensor data like that motion games.

U103(SUB_FPCB): MPU3050 IC is interfaced to OMAP3630(U301) using I2C interface.

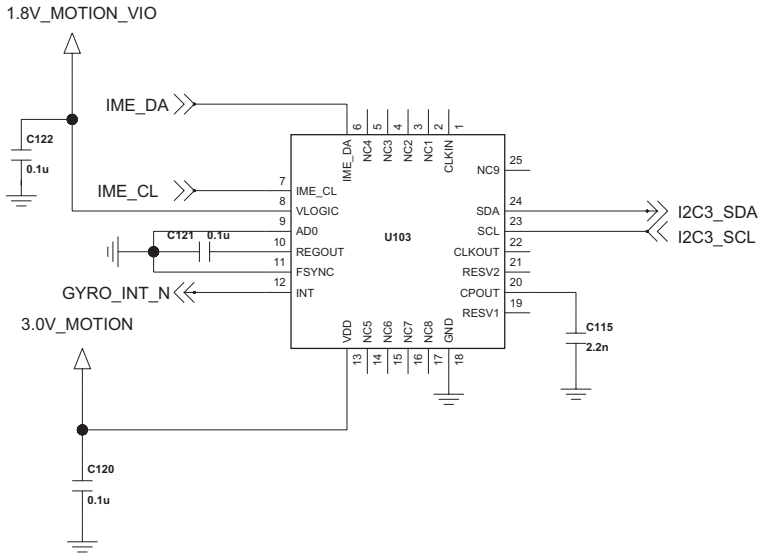


Figure. Gyro Sensor Schematic

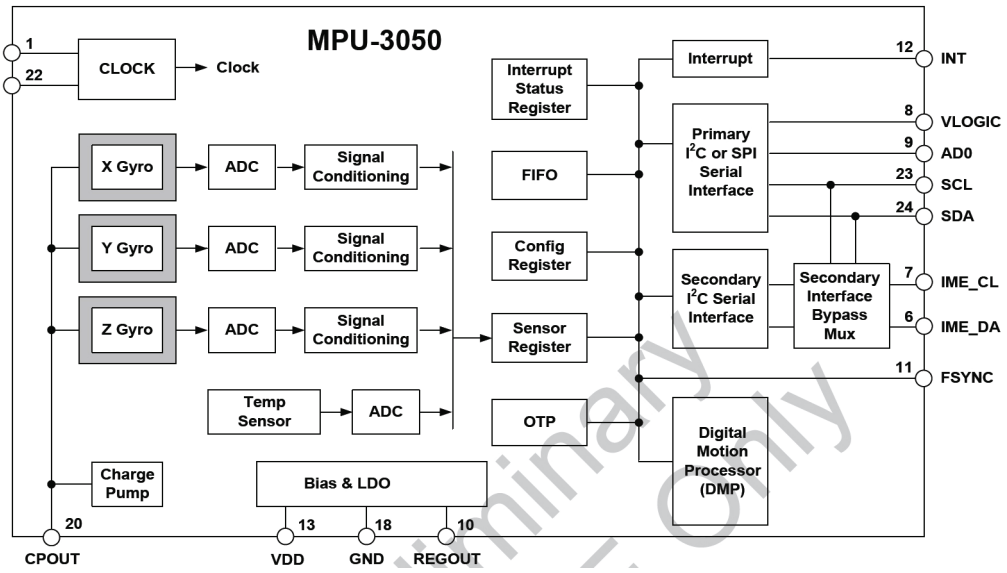


Figure. Gyro Sensor Block Diagram

3.20 Proximity Sensor

When the call is connected and the object close to the proximity sensor,

LCD backlight and Touch screen are disable operation automatically.

U102(VT_CAM FPCB) : GP2AP002S00F IC used I2C interface to OMAP3630

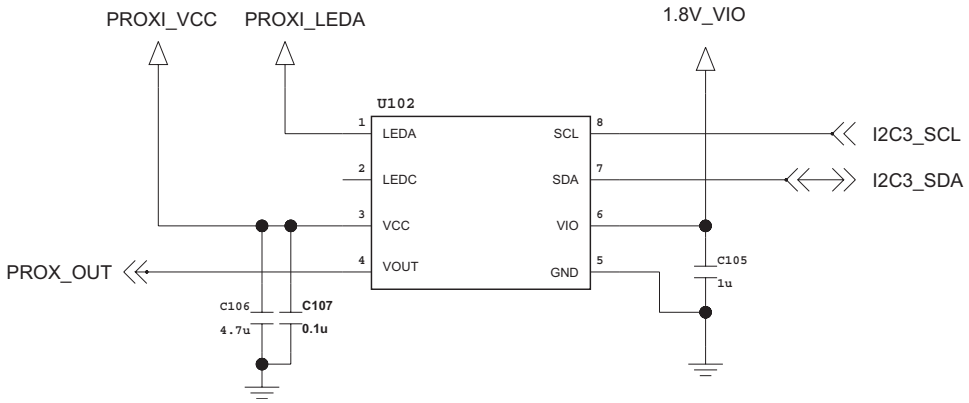


Figure. Proximity Sensor Schematic

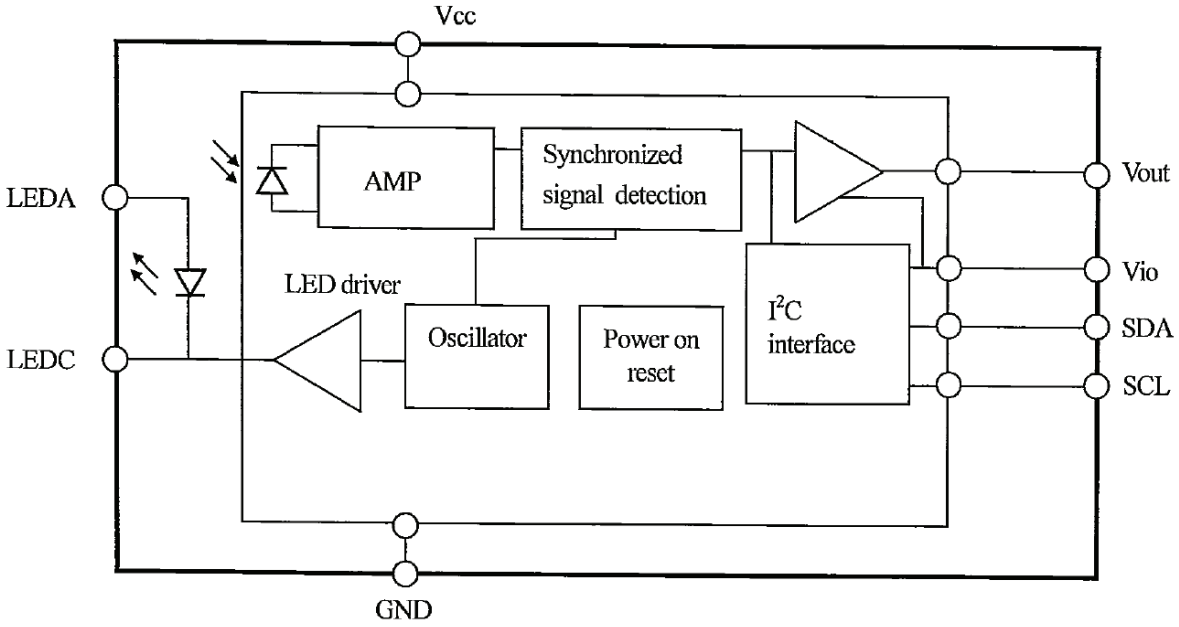


Figure. Proximity Sensor Block Diagram

3.21 Illumination Sensor

Illumination Sensor adjusts LCD backlight current by detecting the surrounding brightness.

If user checks the automatic brightness menu, LCD backlight current adjusting is to be enable automatically.

U101(VT_CAM FPCB) : BH1621 IC interface to AAT2870

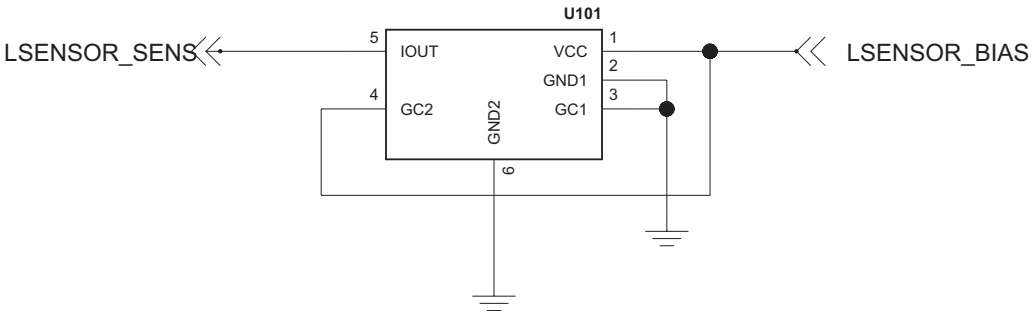


Figure. Illumination Sensor Schematic

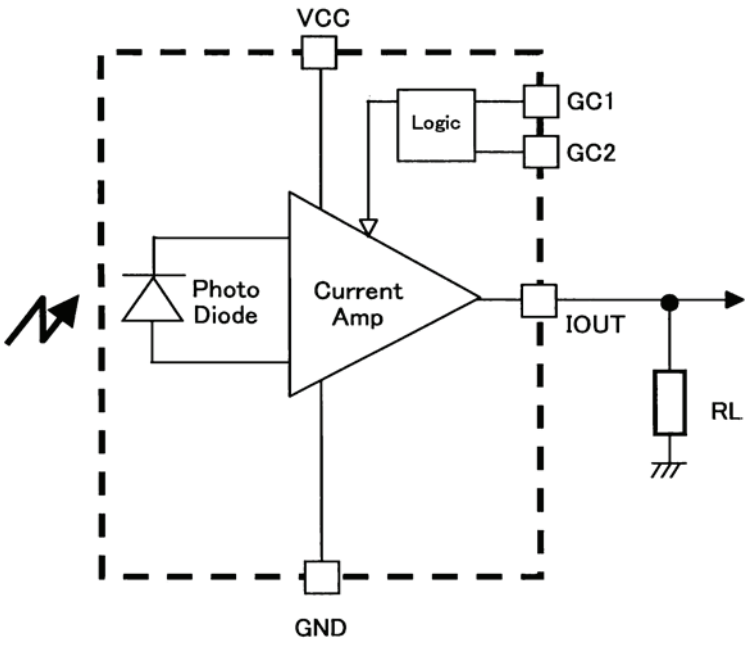


Figure. Illumination Sensor Block Diagram

3.22 Touch Module

Touch module is connected to Main PCB with 10-pin connector.

The Touch module is controlled by I2C Interface in OMAP3630

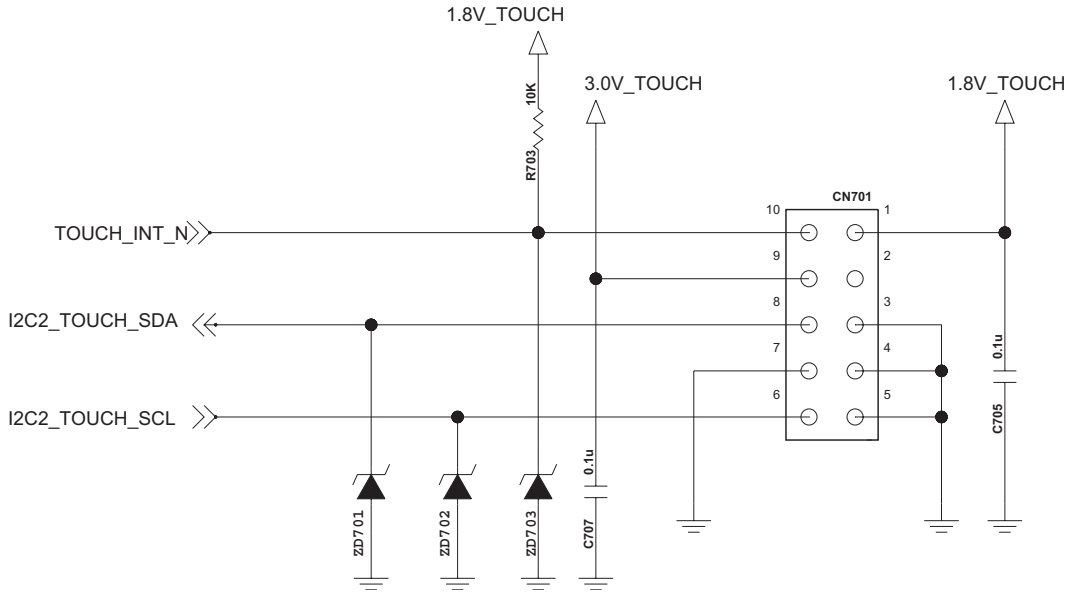


Figure. Schematic of Touch connector (Main Board)

Pin No.	Signal	Description
1	1.8V TOUCH	Power Supply for Interface I/O
2	NC	-
3	GND	-
4	GND	-
5	GND	-
6	I2C2_TOUCH_SCL	I2C Clock
7	GND	-
8	I2C2_TOUCH_SDA	I2C Data
9	3.0V TOUCH	Power Supply for Driver IC
10	TOUCH_INT_N	Interrupt

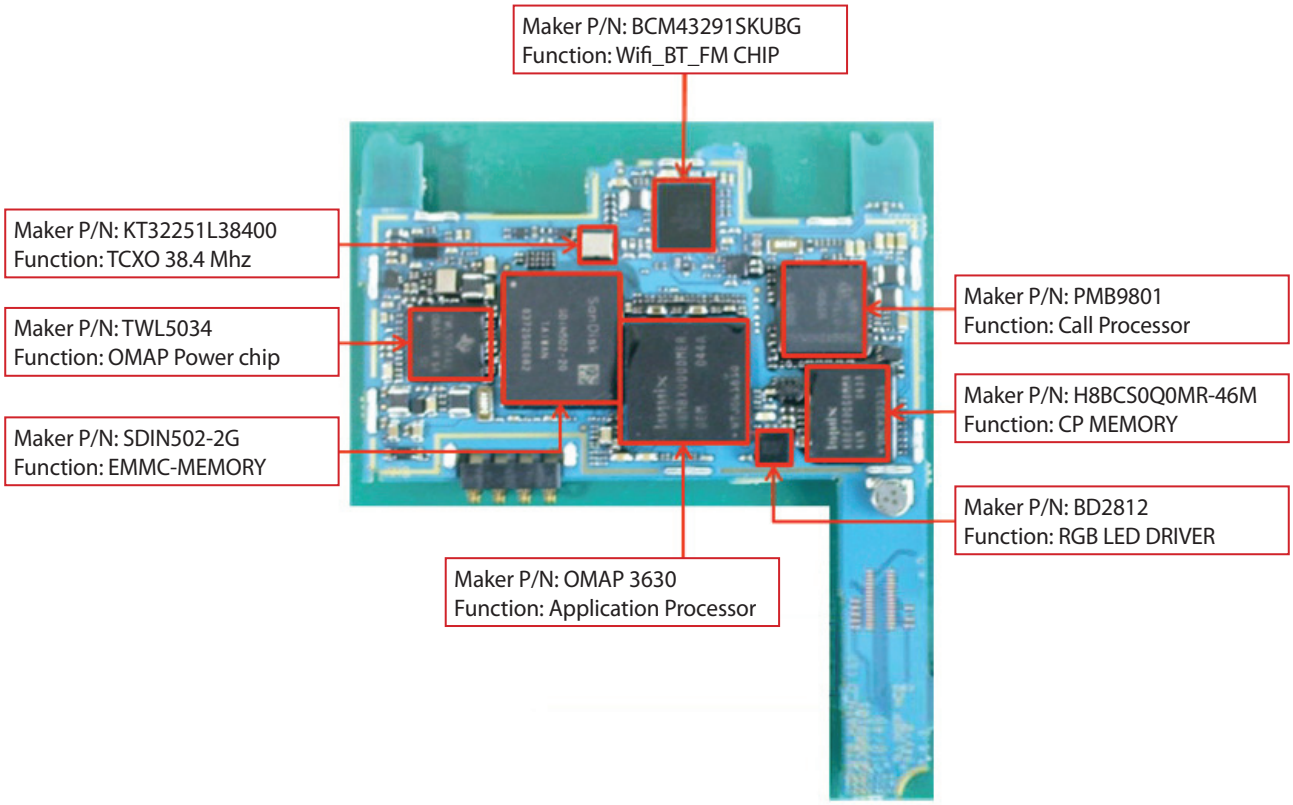
Table. Interface between Touch Module and MAIN Board

3.23 Main Features

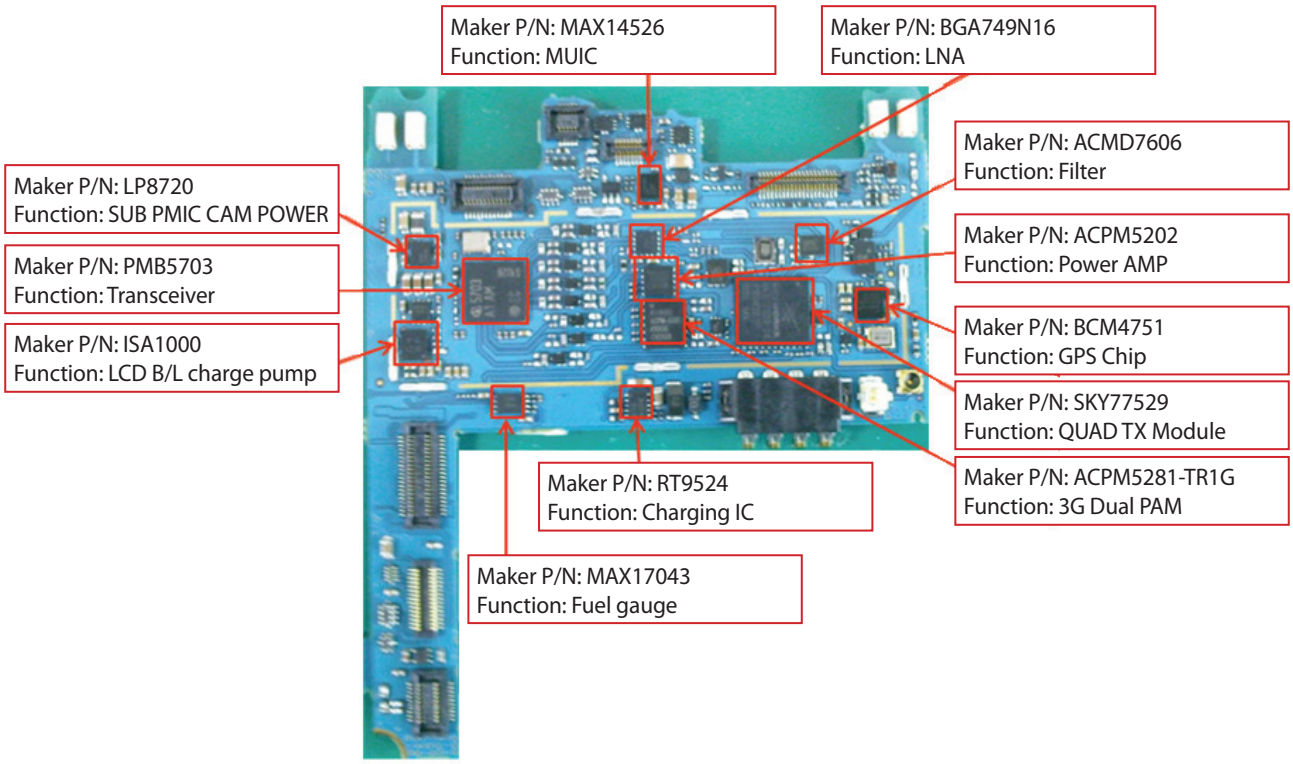
3.23.1 LG-P970 Main Features

- DOP Type design
- UMTS 2100 + UMTS 1900 + UMTS900+ GSM 900 + DCS 1800 + PCS 1900 + GSM850 based GSM/GPRS/EDGE/UMTS(WCDMA, HSDPA, HSUPA)
- HSDPA 7.2Mbps, HSUPA 5.7Mbps
- Main LCD(WVGA)
  TFT Main LCD(4.0", 480X800)
- Capacitive/Electrostatic Touch Window
- 5M AF Camera, 2 M secondary camera
- 3.5Phi Stereo Headset & Speaker phone
- Mobile XMF –Mobile DLS / Scaleable Polyphony
- MP3/AMR/AAC/AAC/WAV/WMA decoder and play
- MPEG4 encoder/decoder and play/save
- JPEG en/decoder
- Supports Bluetooth and HS-USB
- Supports WLAN(802.11b, 802.11g, 802.11n)
- Supports FM Radio
- 1500 mAh (Li-Ion)

3.23.2 LG-P970 Main component (BOTTOM)

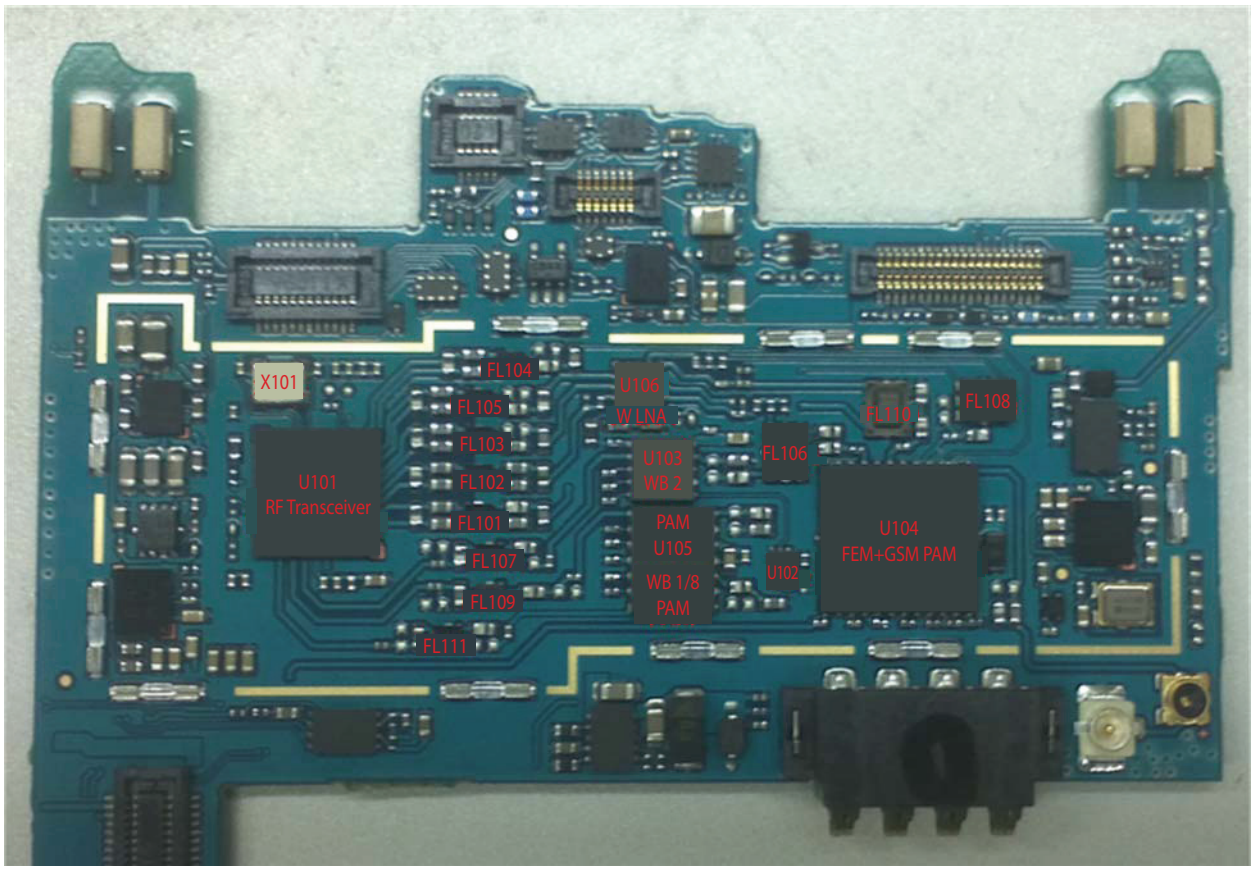


3.23.2 LG-P970 Main component (TOP)



4. TROUBLE SHOOTING

4.1 RF Component

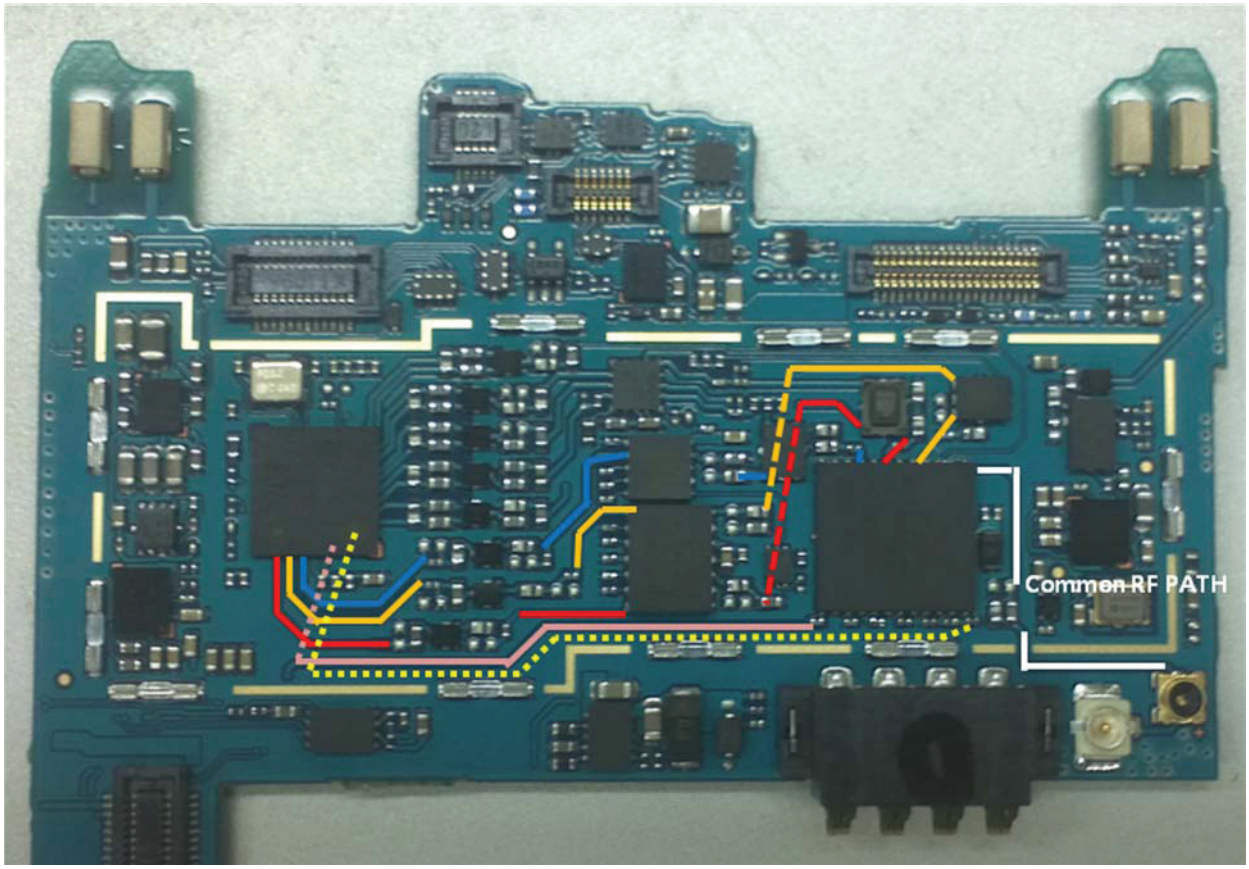


RF component (WCDMA / GSM)

Reference	Description	Reference	Description
U101	PMB5703(Transceiver)	FL108	WCDMA (VIII) Duplexer
U104	FEM + GSM/EDGE PAM Module	FL101	DCS RX SAW Filter
U105	WCDMA Dual (I,VIII) PAM	FL102	W1900/PCS RX SAW Filter
U103	WCDMA Single (II) PAM	FL103	W2100 RX SAW Filter
FL111	WCDMA (I) TX SAW Filter	FL104	GSM850 RX SAW Filter
FL107	WCDMA (II) TX SAW Filter	FL105	W900/EGSM RX SAW Filter
FL109	WCDMA (VIII) TX SAW Filter	U106	WCDMA (I,II,VIII) LNA
FL110	WCDMA (I) Duplexer	X101	TC-VCXO(26MHz)
FL106	WCDMA (II) Duplexer	U102	WCDMA Power Detector

4.2 SIGNAL PATH

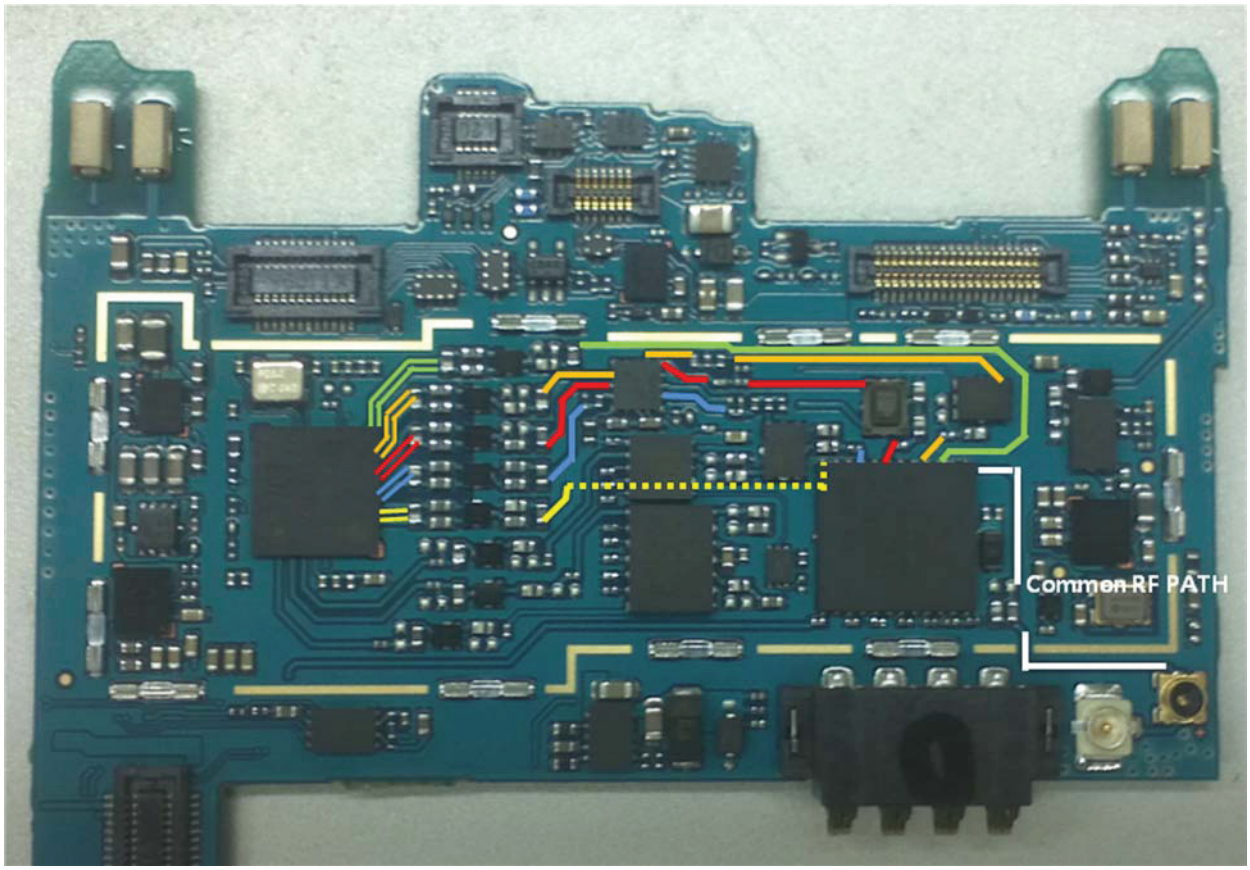
WCDMA / GSM Tx PATH



WCDMA 2100 TX PATH, WCDMA 1900 TX PATH, WCDMA 900 TX PATH

GSM Low Band Tx PATH, GSM Hign Band Tx PATH

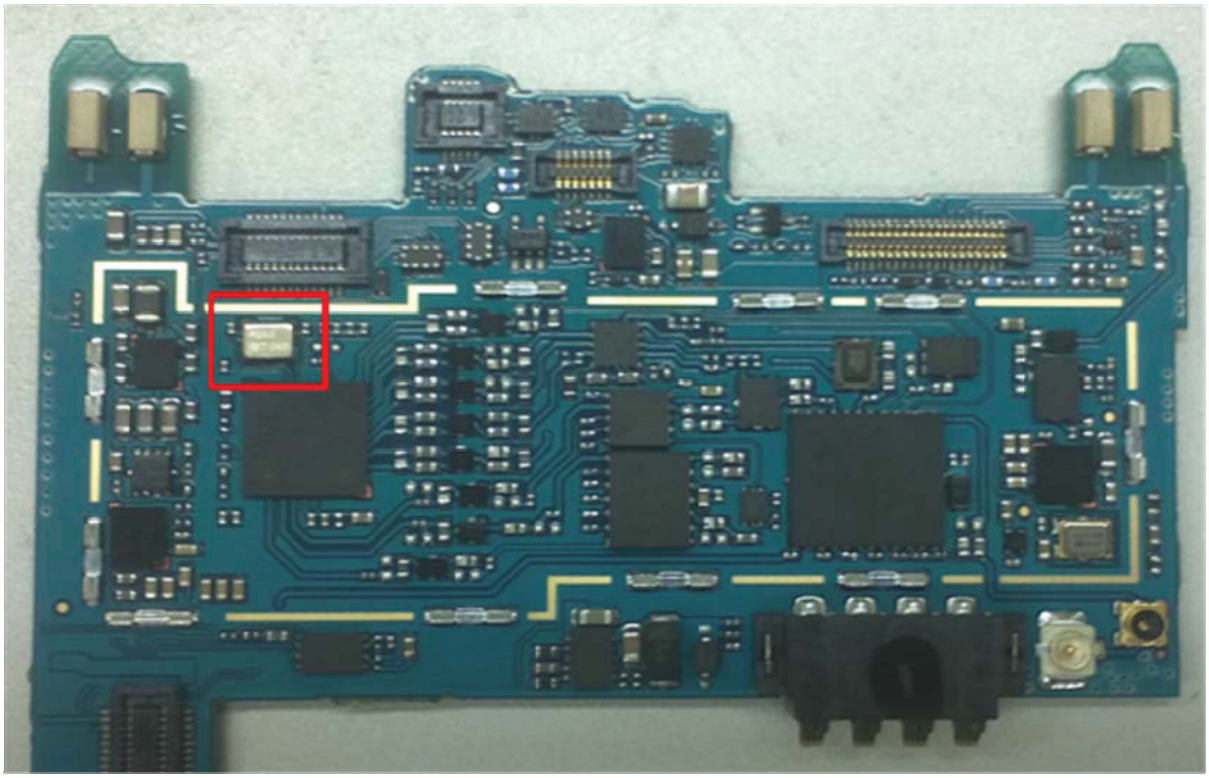
WCDMA / GSM Rx PATH

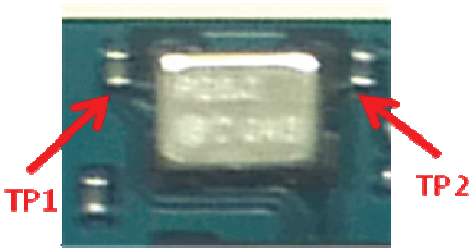


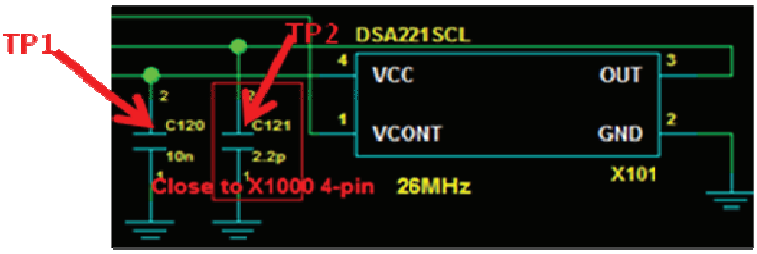
WCDMA 2100 RX PATH, WCDMA 1900/PCS RX PATH, WCDMA 900/EGSM TX PATH
DCS Band Rx PATH, GSM 850 Band Rx PATH

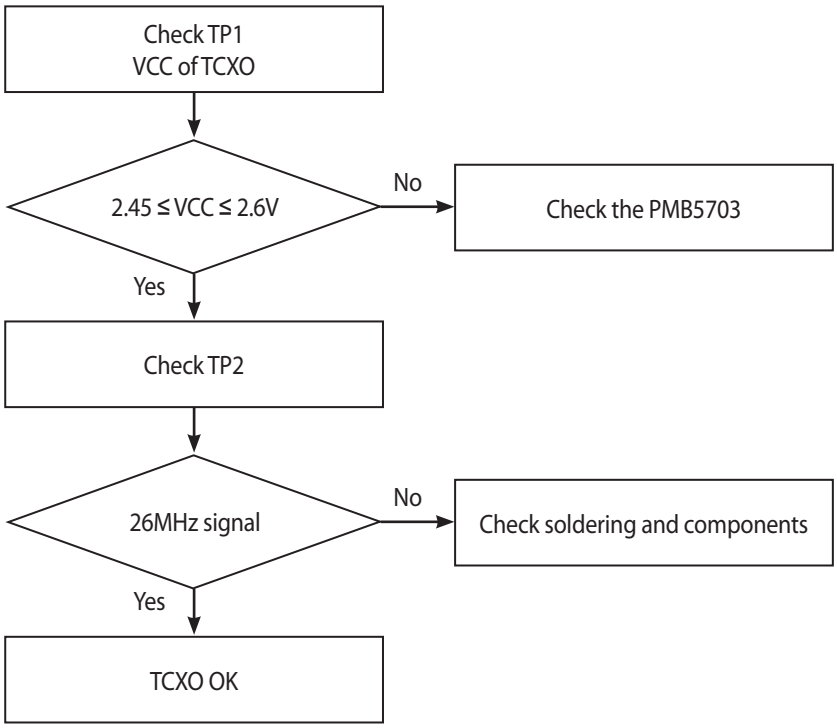
4.3 Checking TCXO Block

The output frequency (26MHz) of TCXO (X101) is used as the reference one of PMB5703

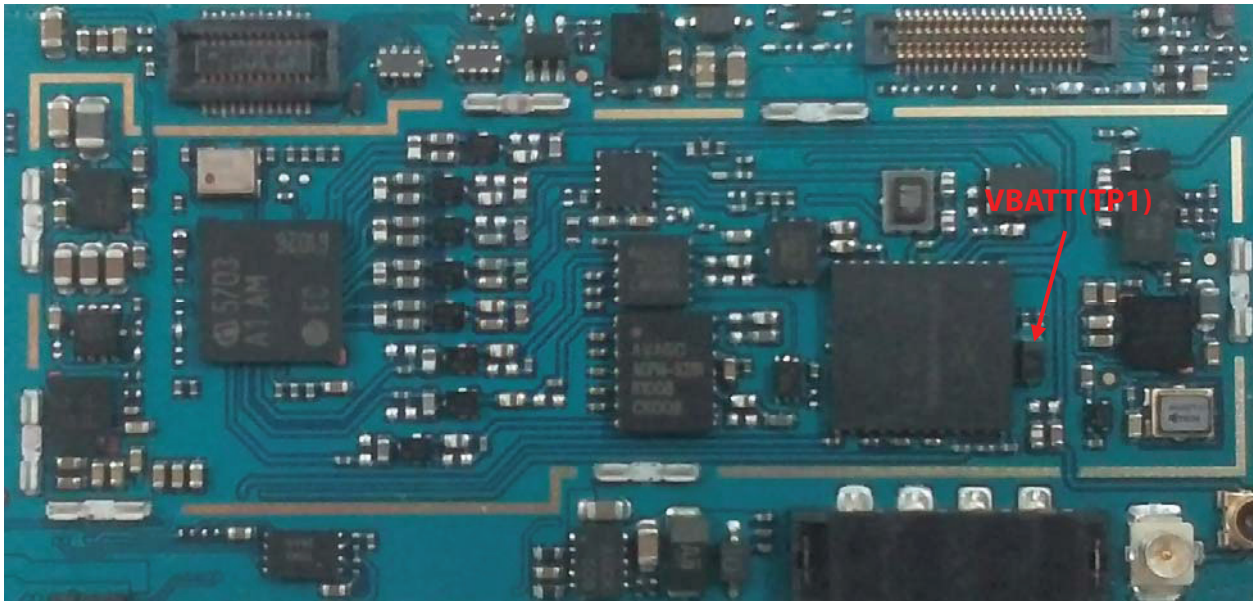


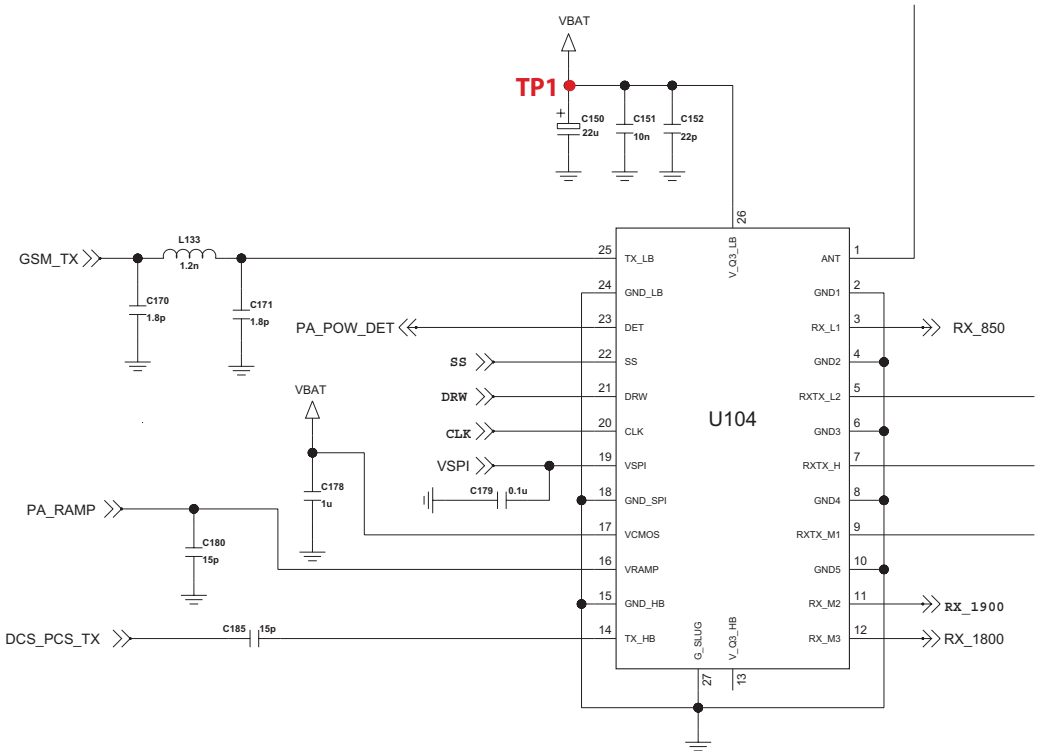






4.4 Checking GSM TX Module(GSM PAM + FEM) Block





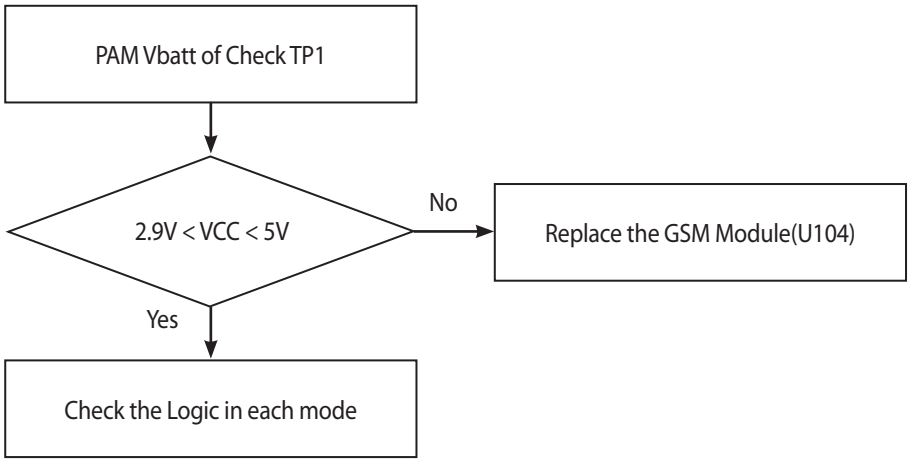
Schematic of the TX Module

D0	Band Select	D10	D9	Sensor Configuration
0	Low band	0	0	Current sensor FB Off
1	High bond	0	1	Current sensor FB Off
D1	Mode Select	1	0	Current sensor FB Off
0	GMSK	1	1	Current sensor FB Off
1	SPSK			

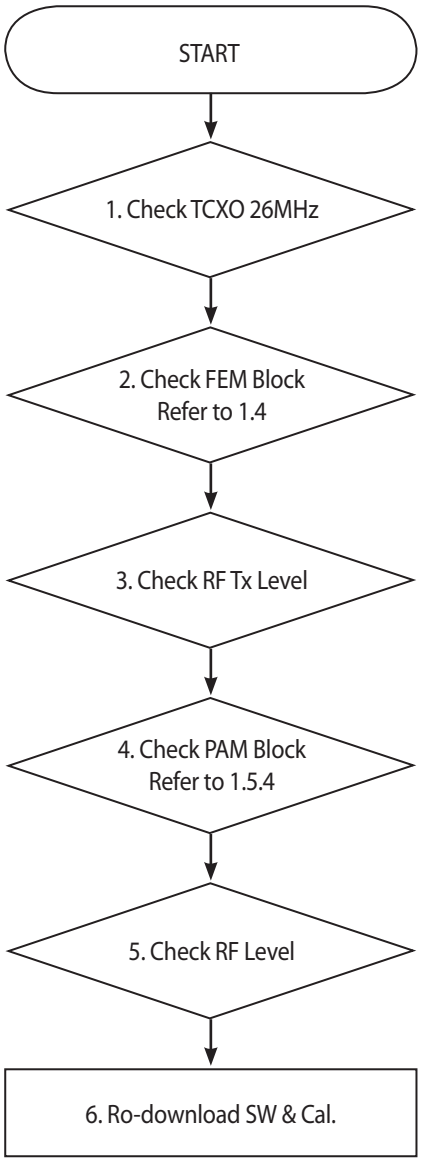
D2	Tx Enable	D15	FE Bcost Comenter
0	PA off	0	Off
1	PA On	1	On

D5	D4	D3	Current Sensor		D14	D13	D12	D11	FE Status
			Mode-GMSDK	Mode-SPSK					
0	0	0	1.6A	0.6A	0	0	0	0	Off
0	0	1	1.7A	0.7A	0	0	0	1	Tx-M GMSK ANT1
0	1	0	1.8A	0.8A	0	0	1	0	Tx-L GMSK ANT1
0	1	1	1.9A	0.9A	0	0	1	1	Reserved
1	0	0	2.0A	1.0A	0	1	0	0	Rx-L1
1	0	1	2.1A	1.1A	0	1	0	1	Rx-M2
1	1	0	2.2A	1.2A	0	1	1	0	Rx-M3
1	1	1	2.3A	1.3A	0	1	1	1	Reserved
D8	D7	D6	Not Assigned to Specifiic Runction		1	0	0	0	Rx/Tx-L2
0	0	0	Defaut		1	0	0	1	Rx/Tx-M1
0	0	1			1	0	1	0	Rx/Tx-H
0	1	0			1	0	1	1	Reserved
0	1	1			1	1	0	0	Reserved
1	0	0			1	1	0	1	Tx-M GMSK ANT2
1	0	1			1	1	1	0	Tx-L GMSK ANT2
1	1	0			1	1	1	1	Reserved
1	1	1							

Checking Switch Block Power Source



4.5 Checking WCDMA Block



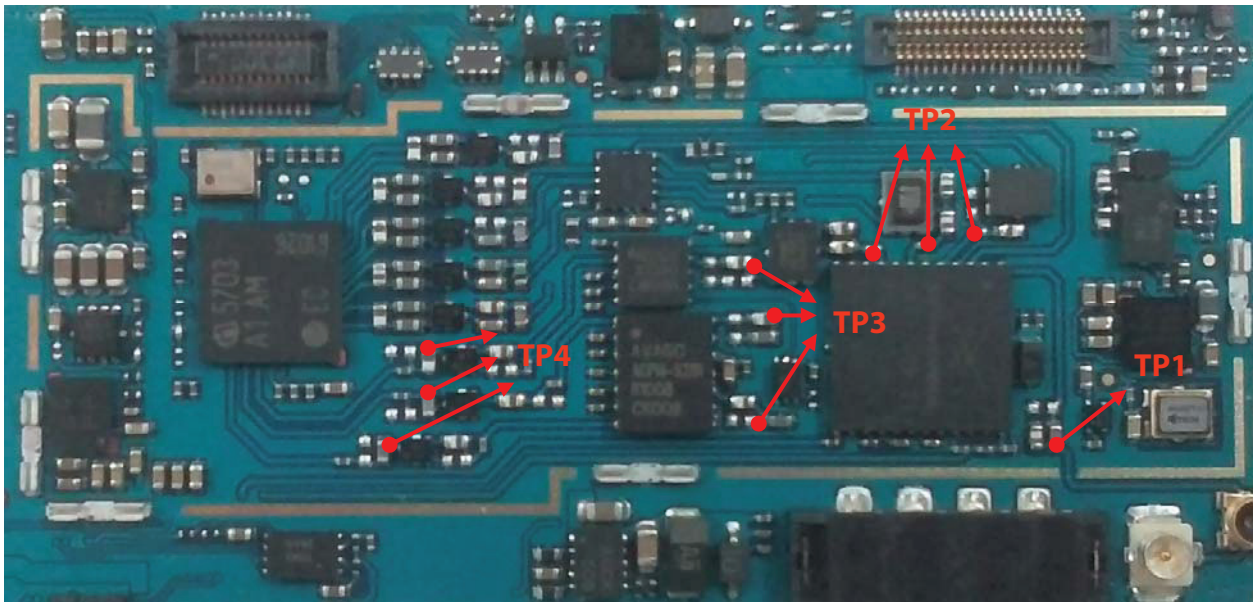
4.5.1 Checking TCXO Block

Refer to 1.3

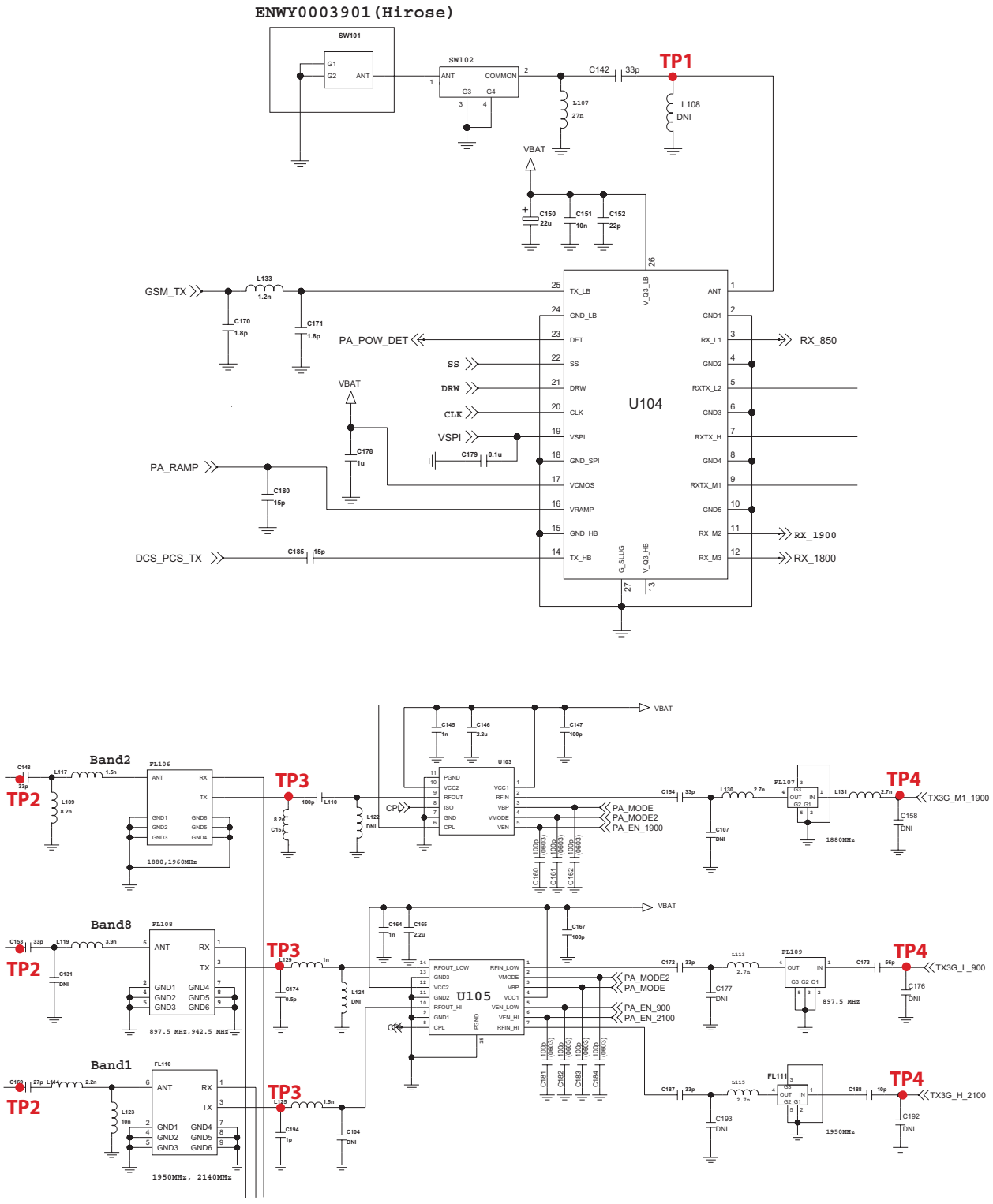
4.5.2. Checking FEM Block

Refer to 1.4

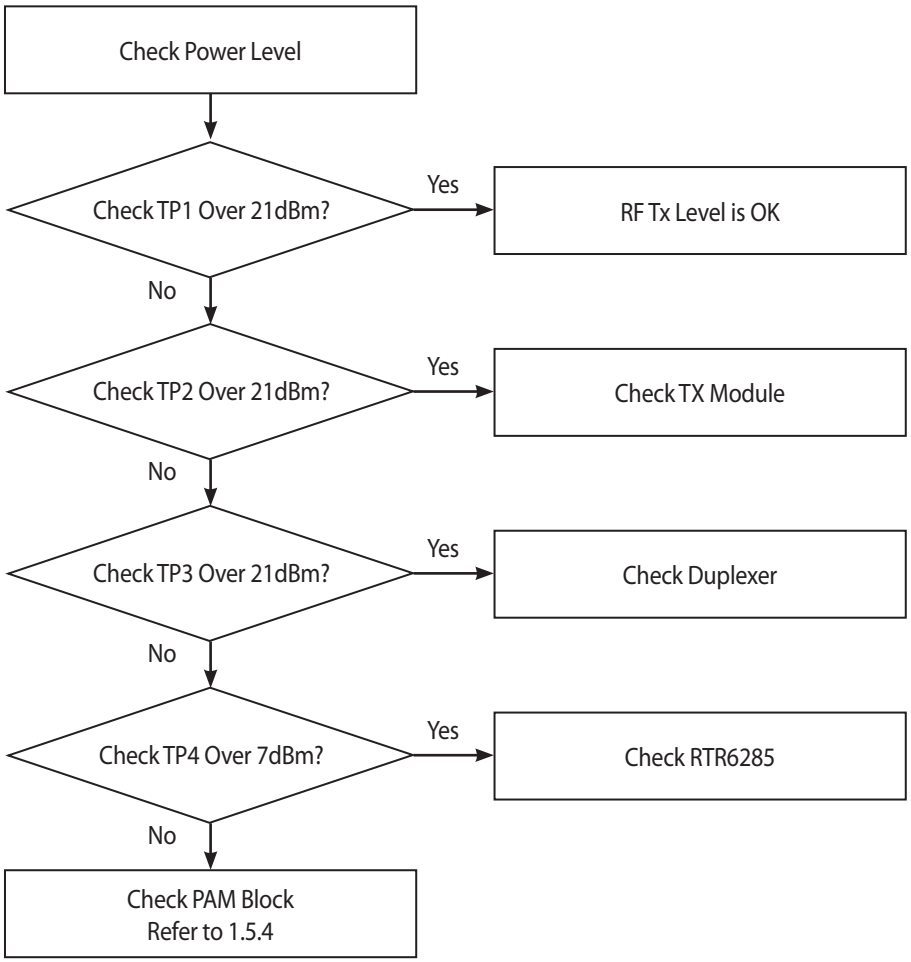
4.5.3. Checking RF TX Level



Test Point (TX Level)



For testing, Max power output is needed.



PMB5703 Maximum output Power = 7 dBm
PMB5703 minimum output Power = -73 dBm

4.5.4 Checking PAM Block

PAM control signal

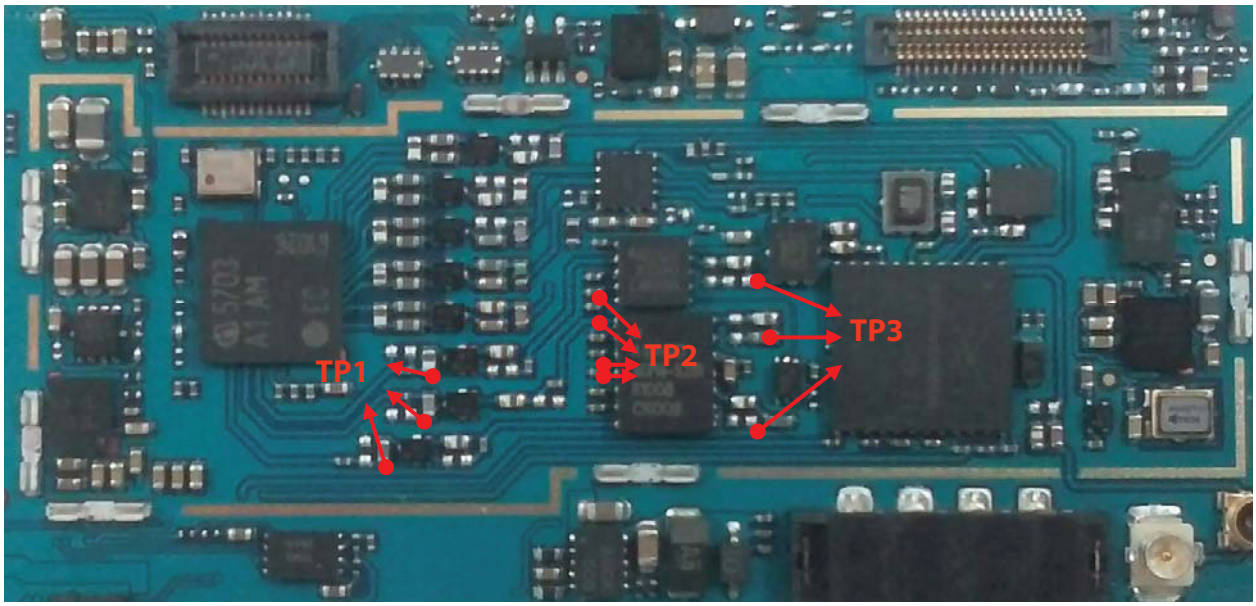
W_PA_EN (W_900_PA_EN(C182),W_1900_PA_EN(C160) W_2100_PA_EN(C181) : PAM Enable
W_PA_MODE1,2 : PAM Gain Control
W_PA_EN must be HIGH (over 2.6V)

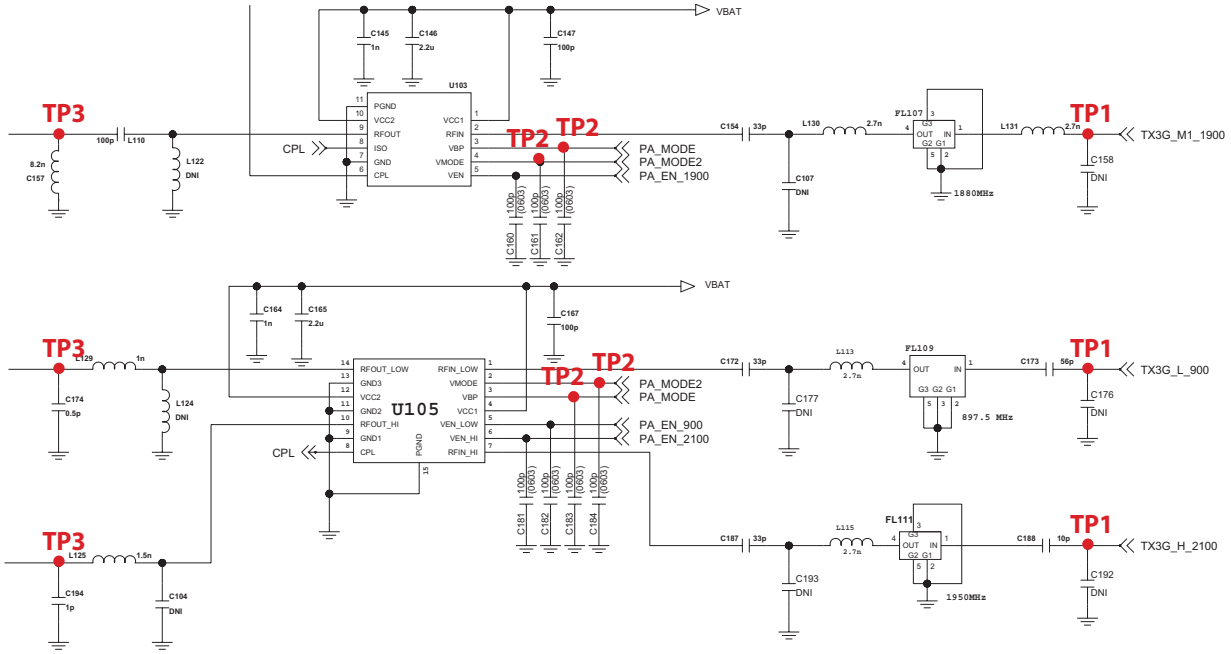
PAM IN/OUT Signal

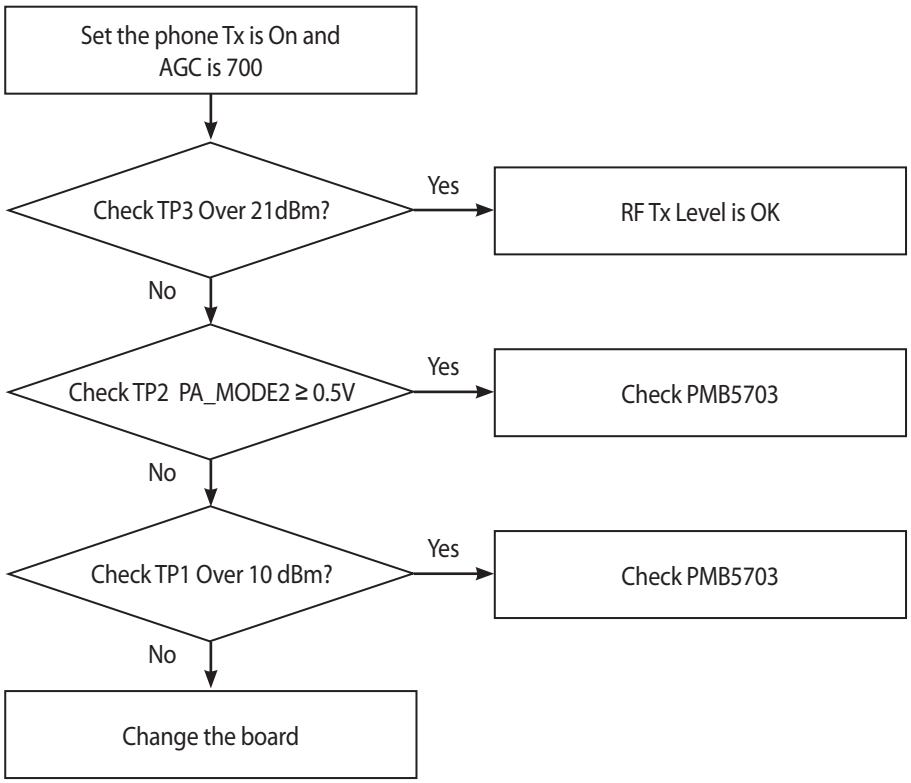
When PAM is under the operation of high power mode
(WCDW_PA_Mode(C162,C183):Low, WCDMA_PA_Mode2(C161,C184):Low),

PAM OUT power must be over 21 dBm

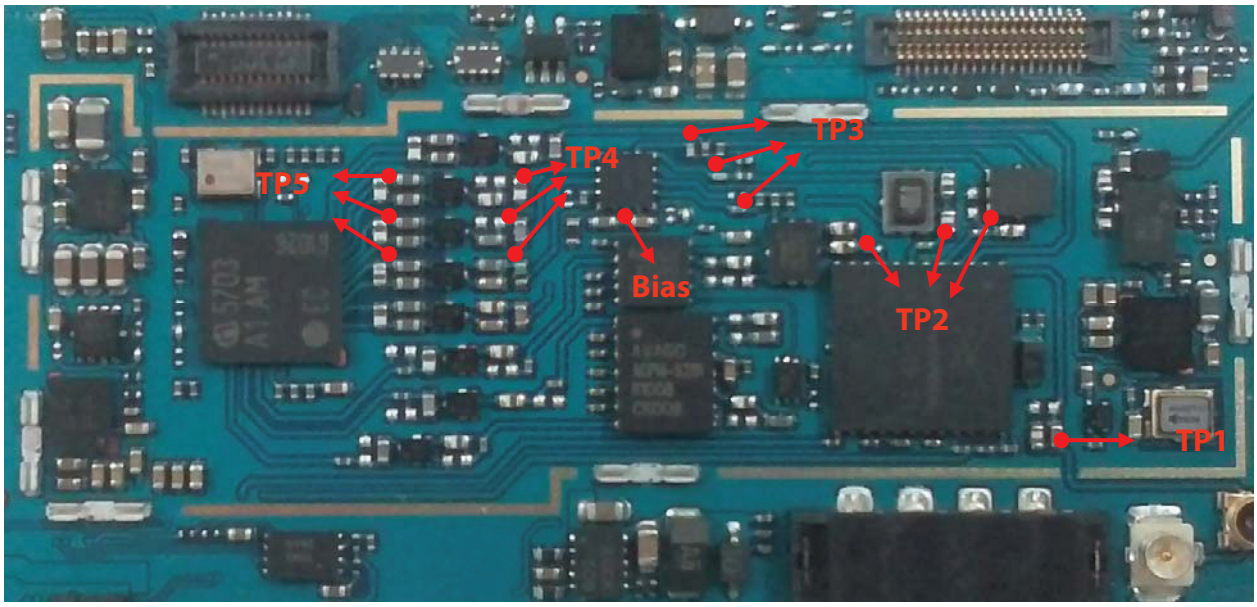
PAM IN power must be under 10 dBm



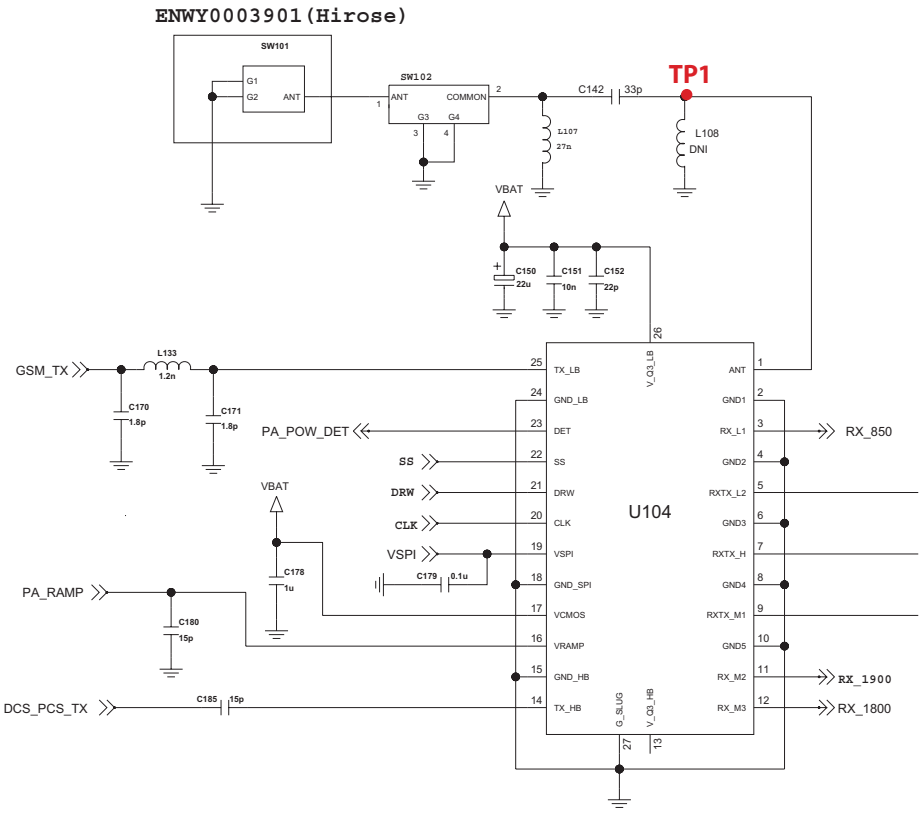


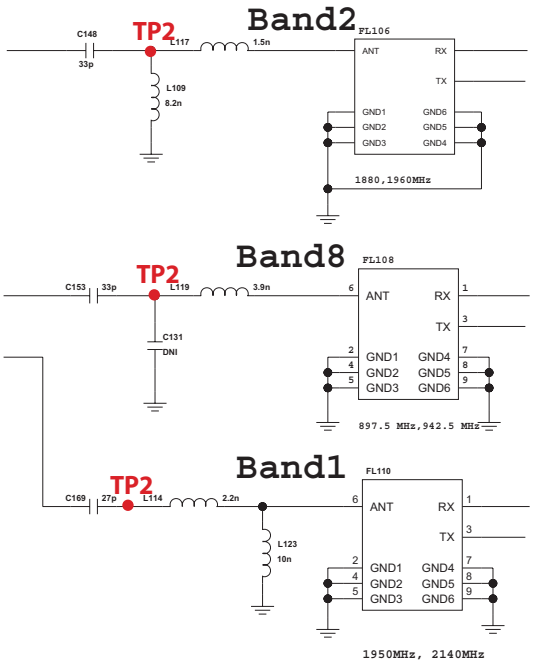


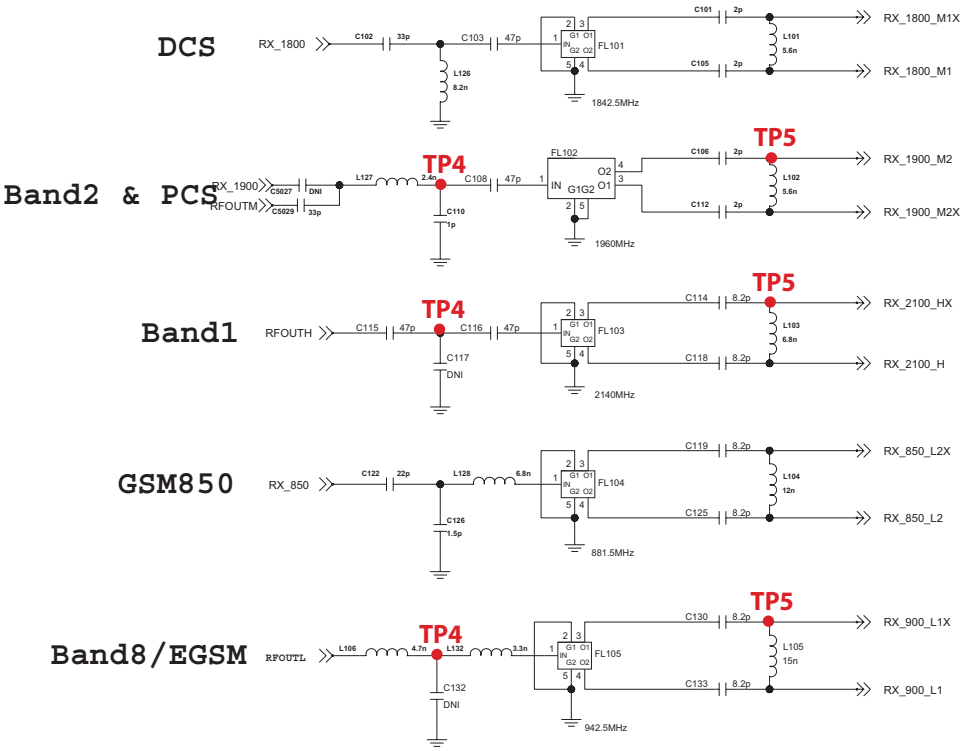
4.5.5 Checking RF Rx Level

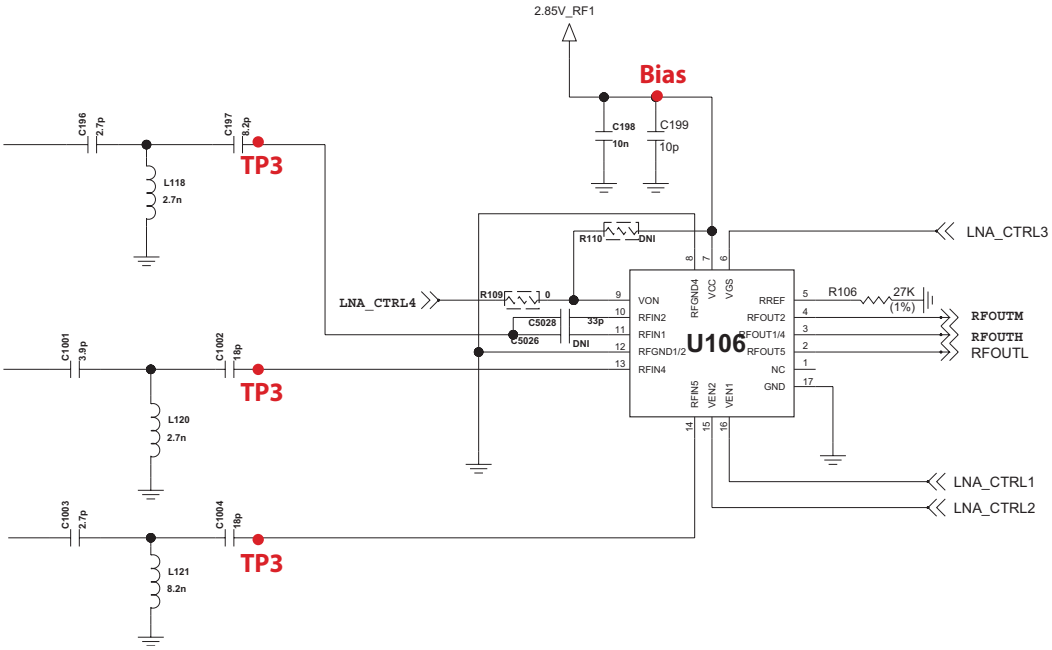


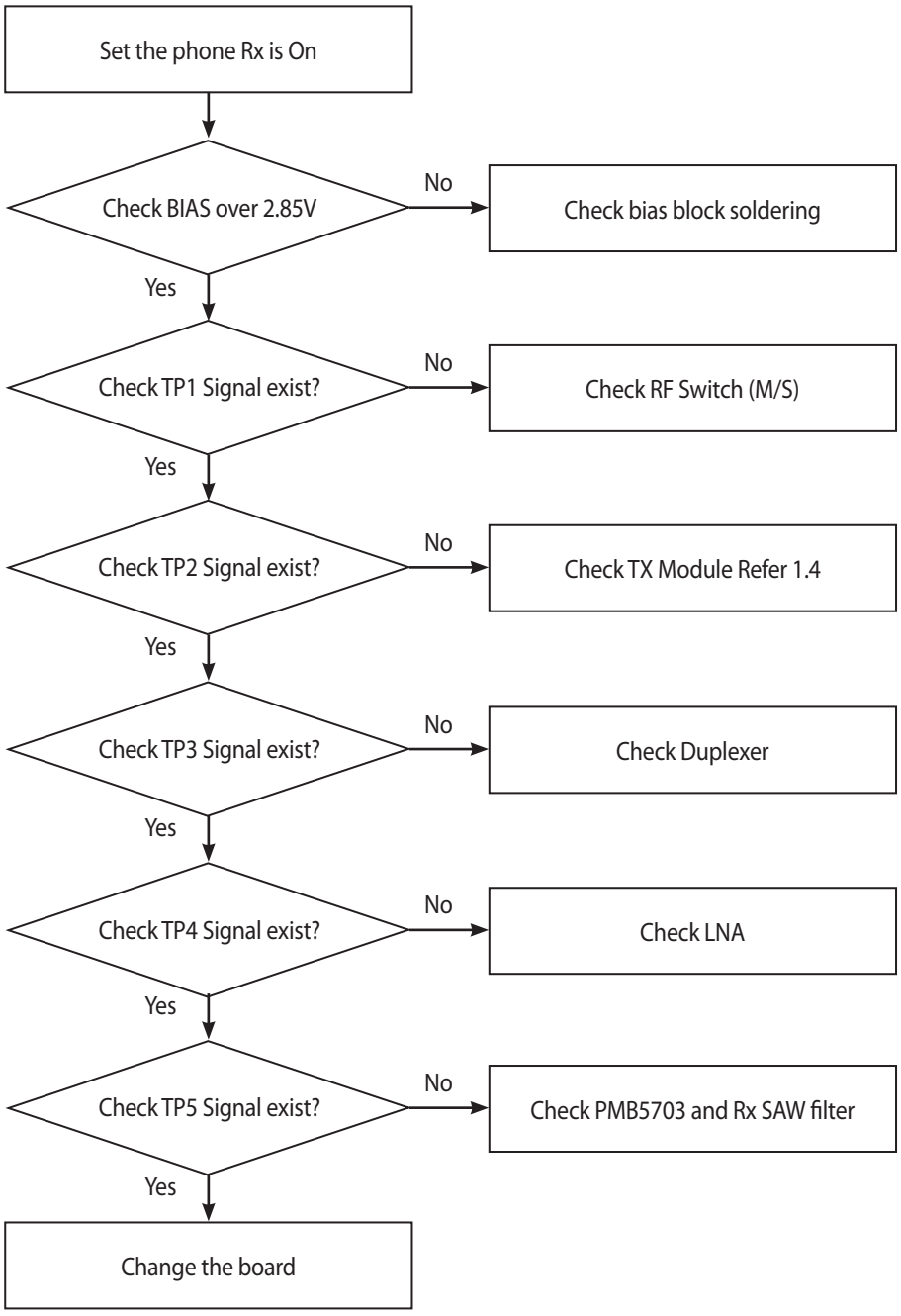
Test Point (RF Rx Level)



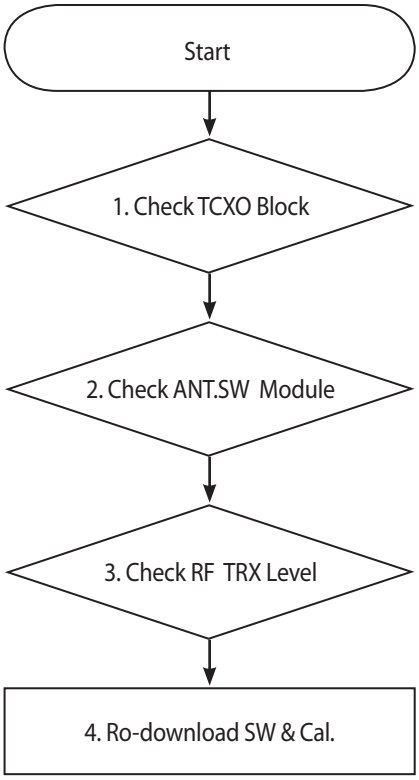


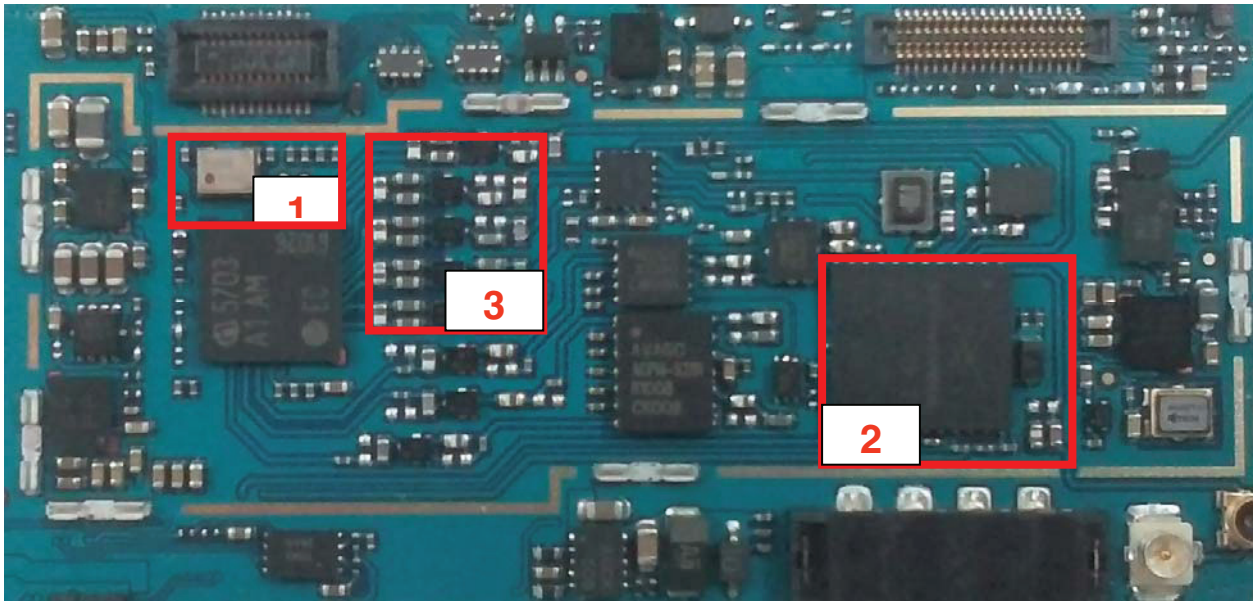






4.6 Checking GSM Block





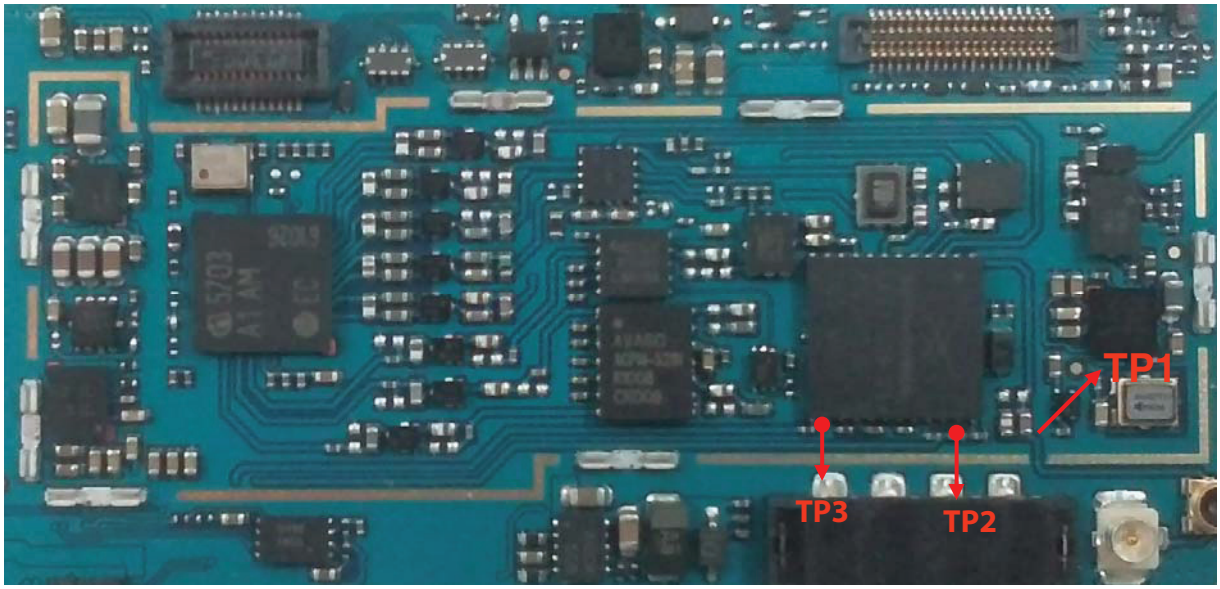
4.6.1 Checking TCXO Block

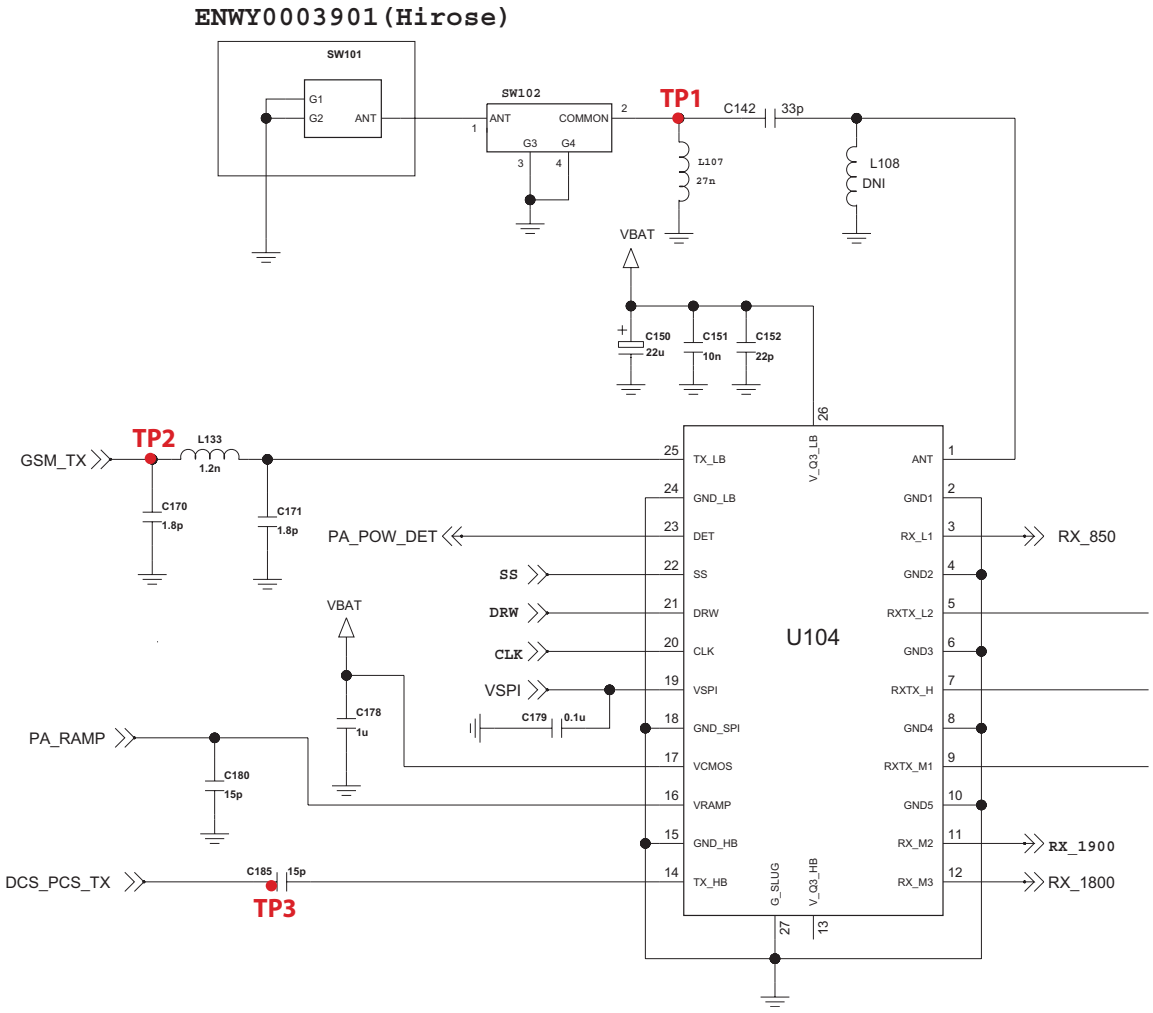
Refer to 1.3

4.6.2 Checking FEM Block

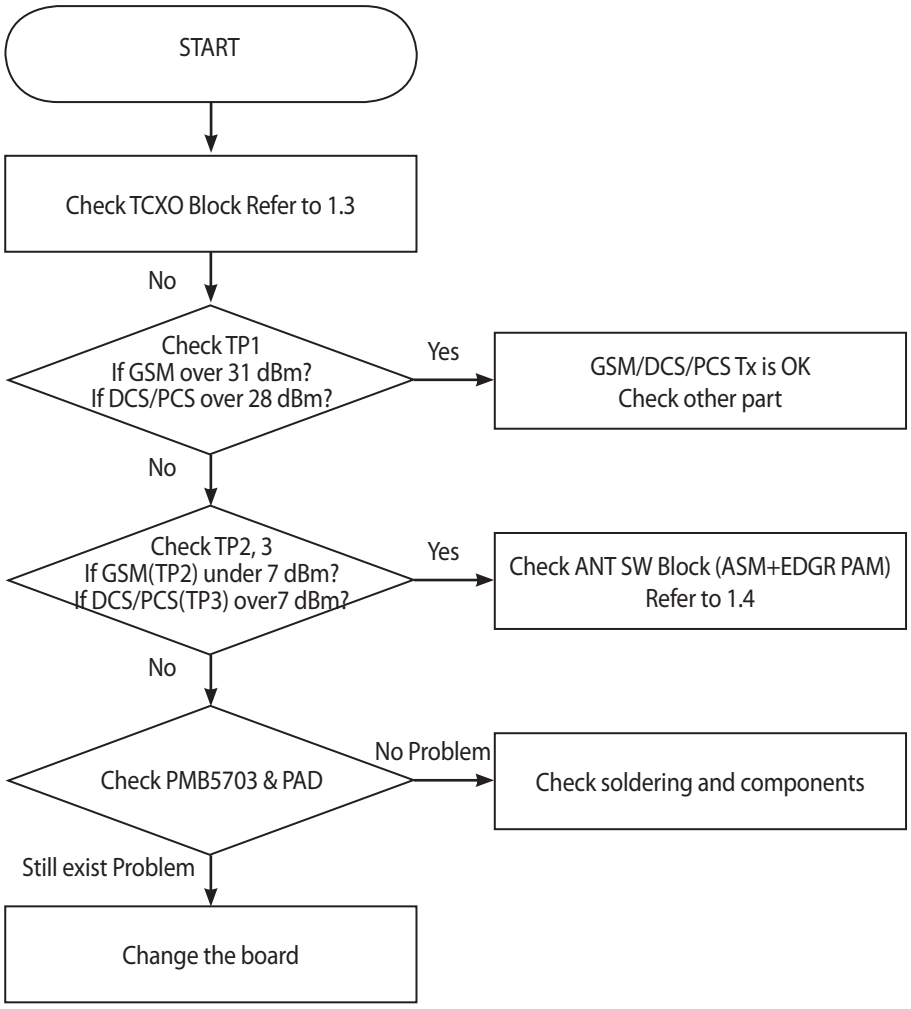
Refer to 1.4

4.6.3 Checking RF TX level

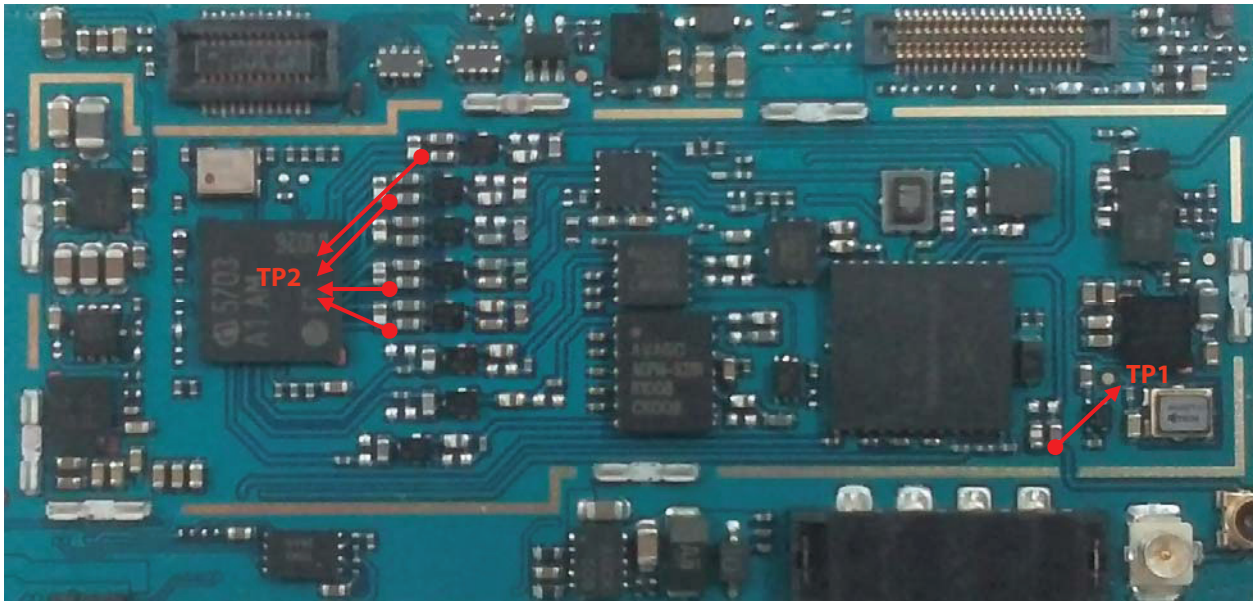


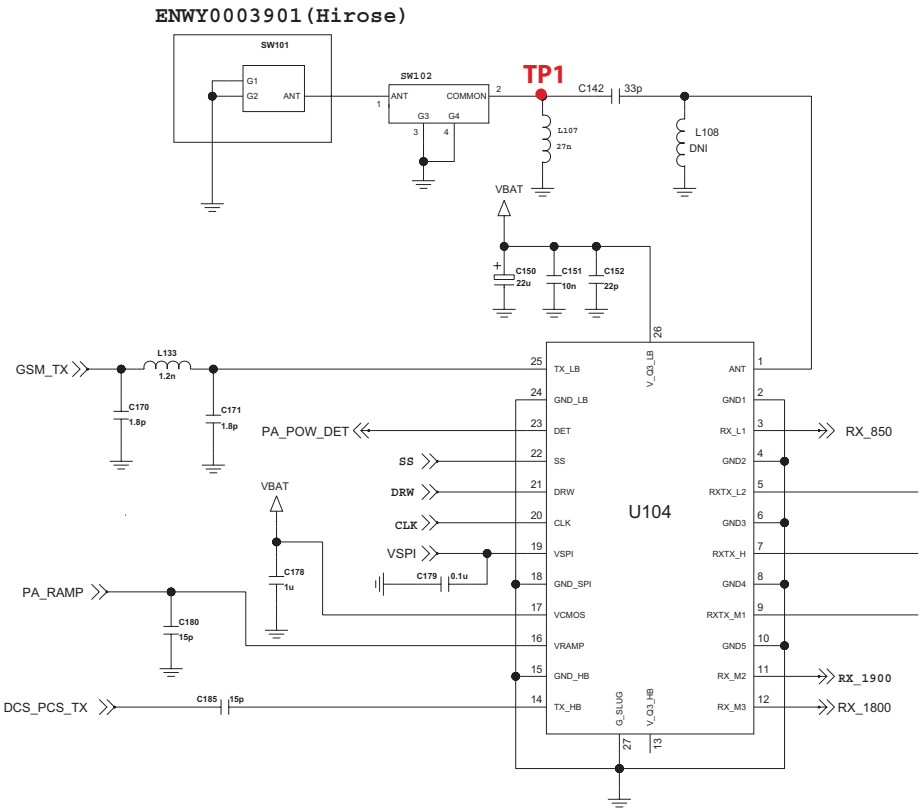


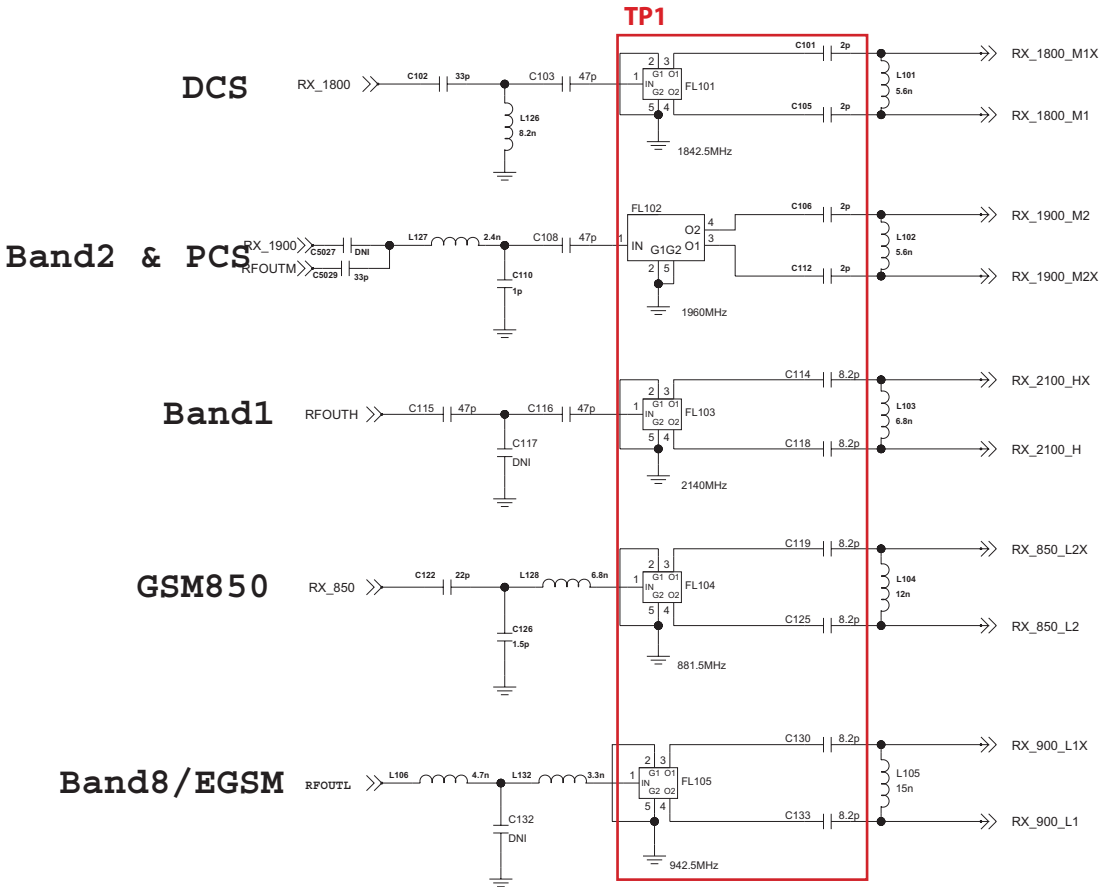
Schematic of GSM/DCS/PCS Tx Block

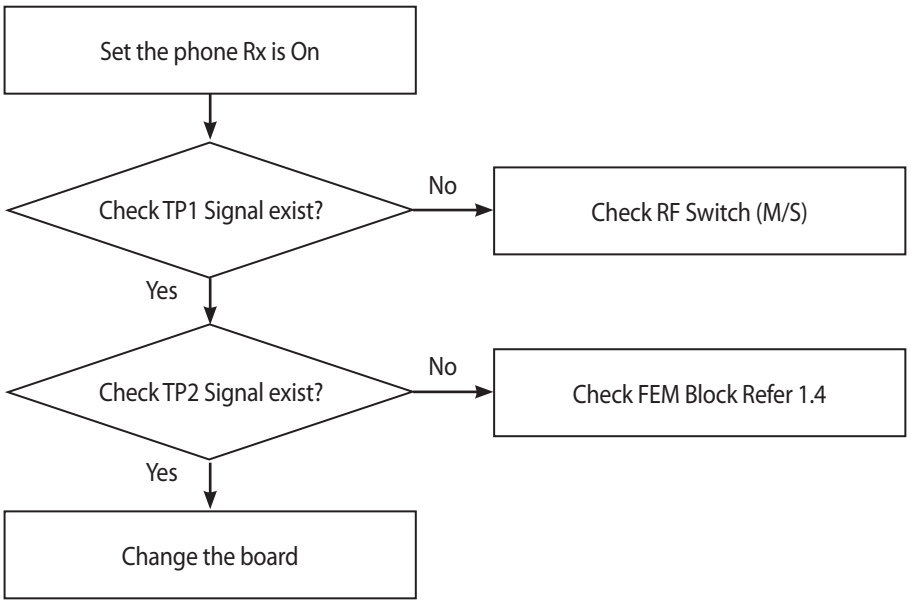


4.6.4 Checking RF Rx Block









4.7 GPS/WIFI/BT RF components

4.7.1 GPS RF Components

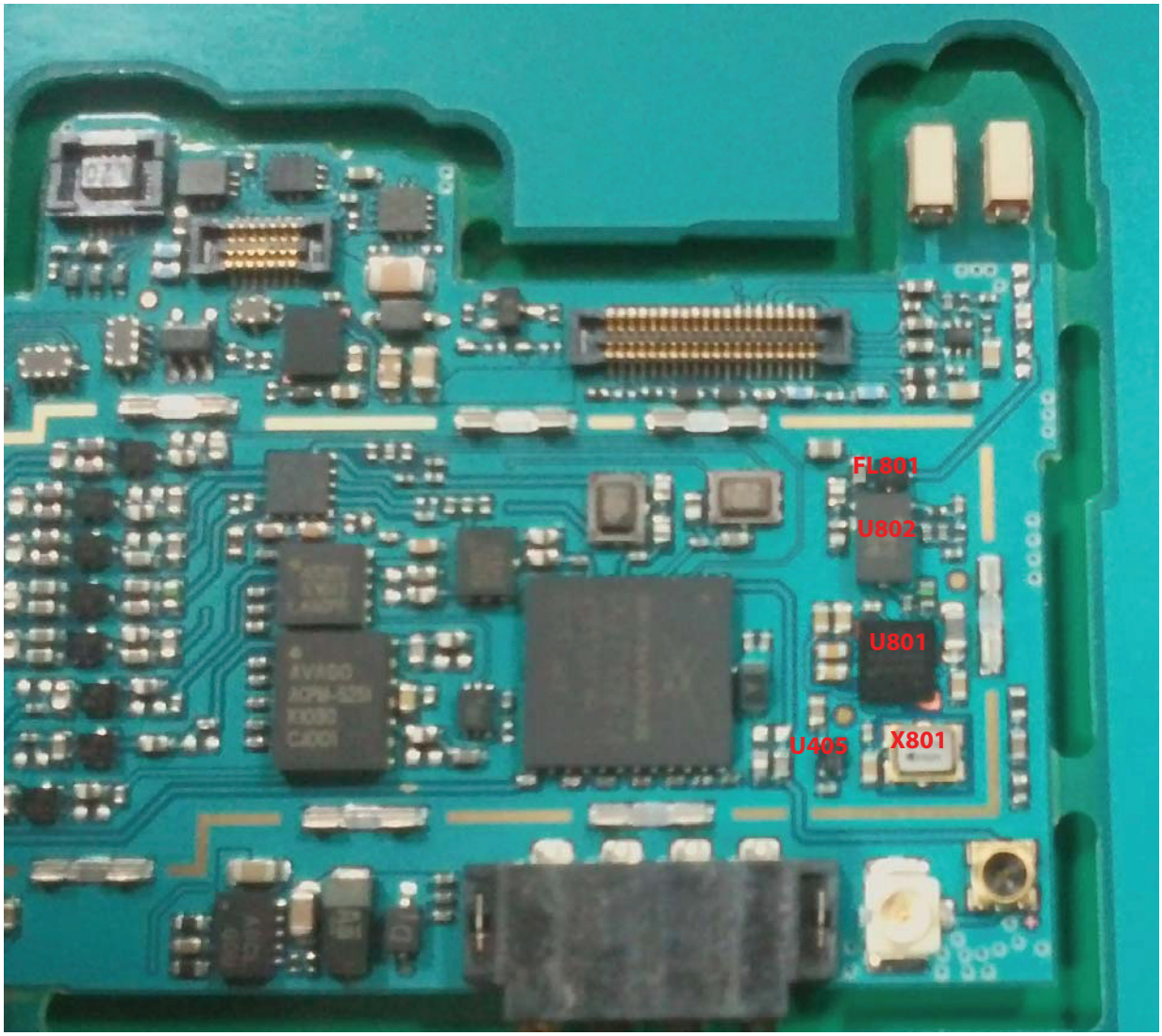


Figure. GPS RF Components on top side of the P970 bear board.

Reference	Description
U801	GPS Chip (BCM4751)
U802	LNA Module (LNA + SAW)
FL801	SAW Filter (1575MHz)
X801	TCXO (26MHz)
U405	LDO (150mA)

4.7.2 Wifi/BT/FM RF Components

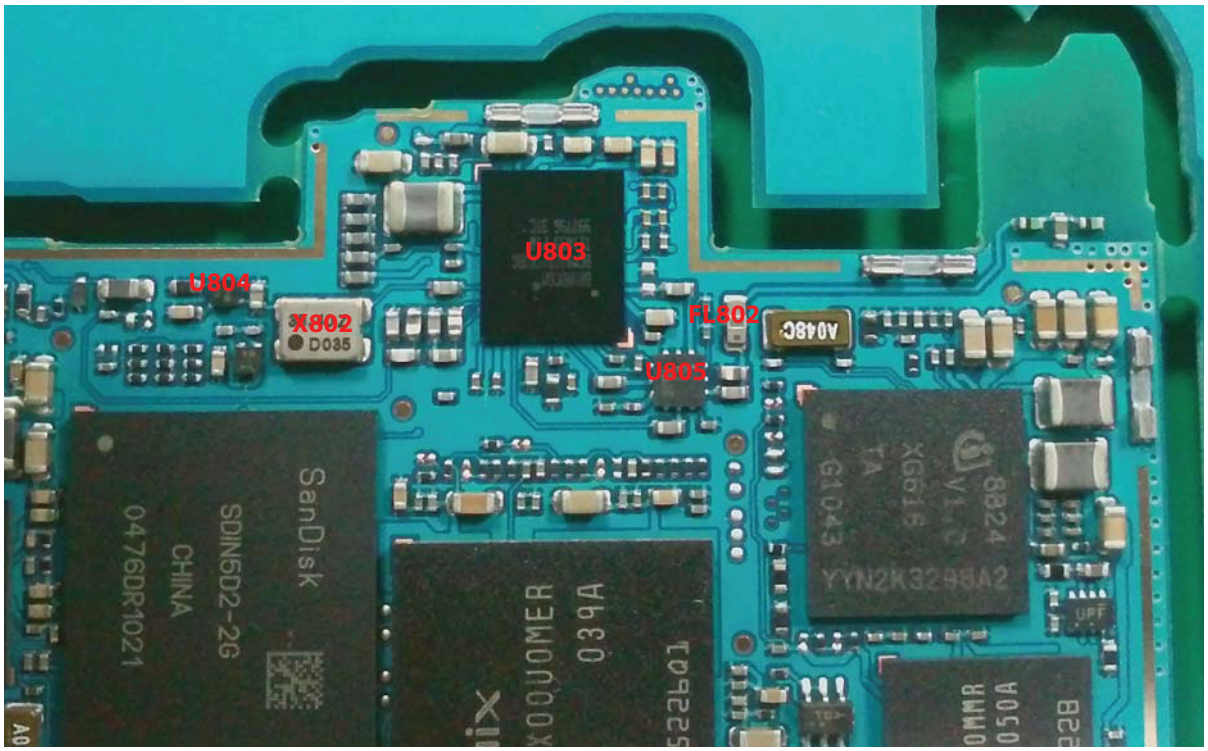


Figure. WiFi /BT /FM Components on bottom side of the P970 bear board.

Reference	Description
U803	WiFi/BT/FM Chip (BCM43291)
U805	FEM Module (SP3T + LNA)
FL802	Dielectric Filter (2450MHz)
X802	TCXO (26MHz)
U804	LDO (150mA)

4.8 GPS/WIFI/BT SIGNAL PATH

4.8.1 GPS Signal Path

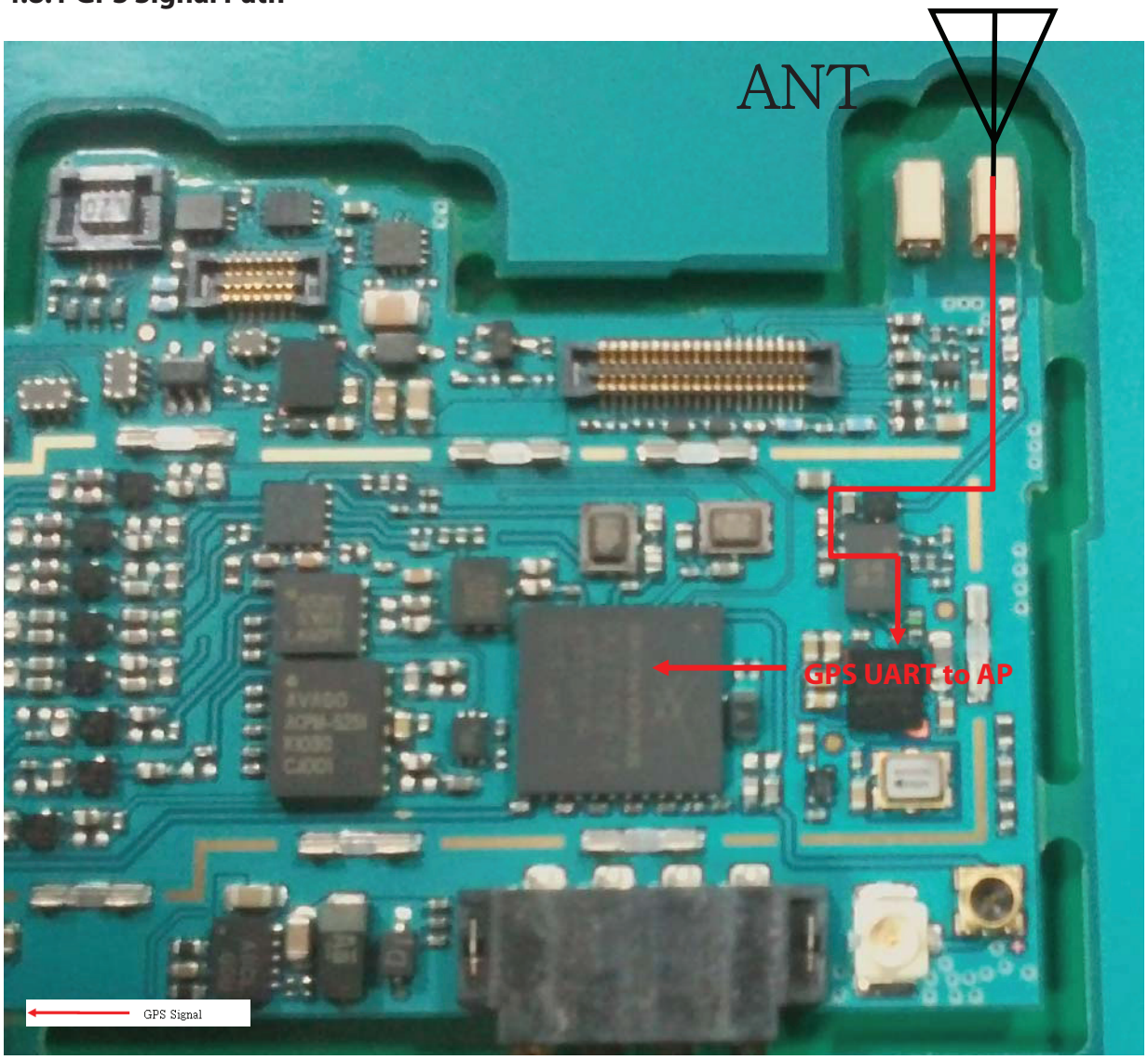


Figure. RF signal path of GPS on top side of the P970 bear board.

4.8.2 Wifi/BT/FM Signal Path

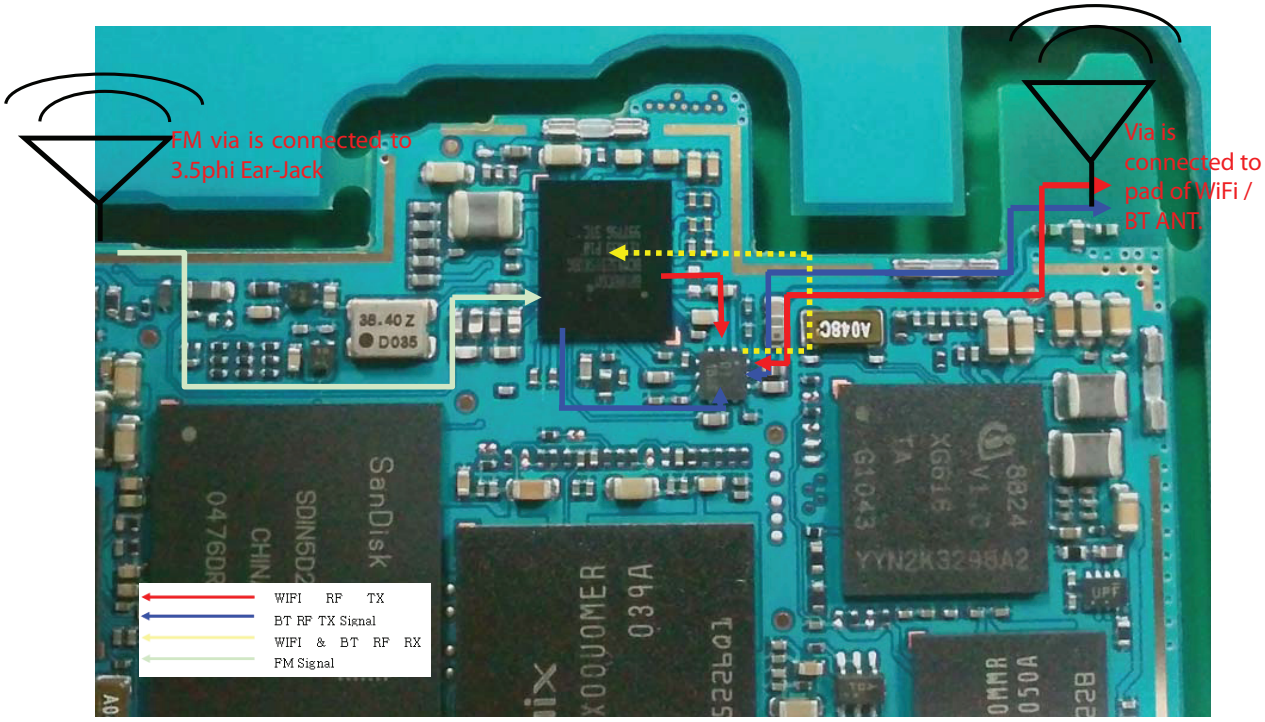


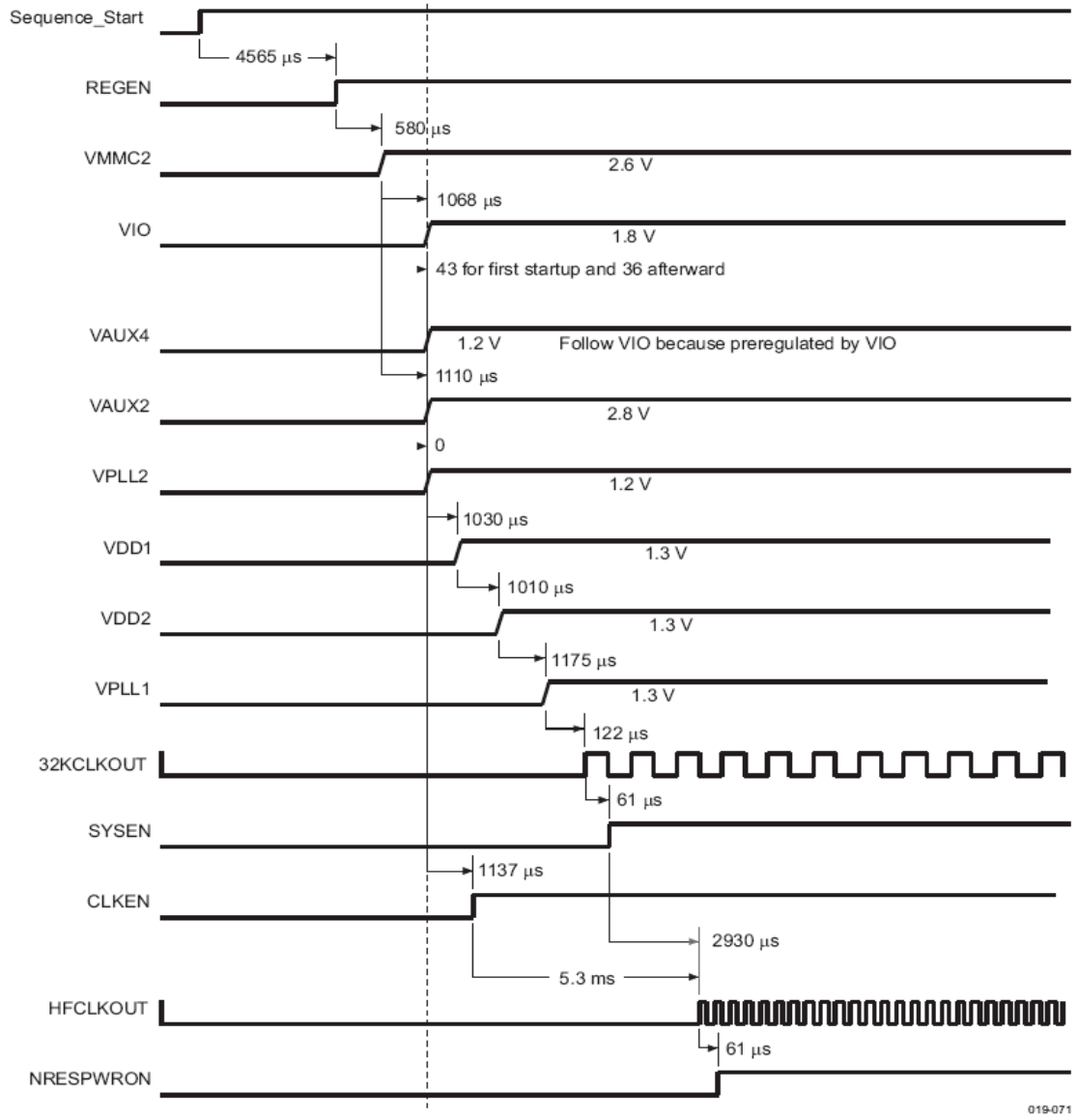
Figure. RF signal path of WiFi/BT/FM on top side of the P970 bear board.

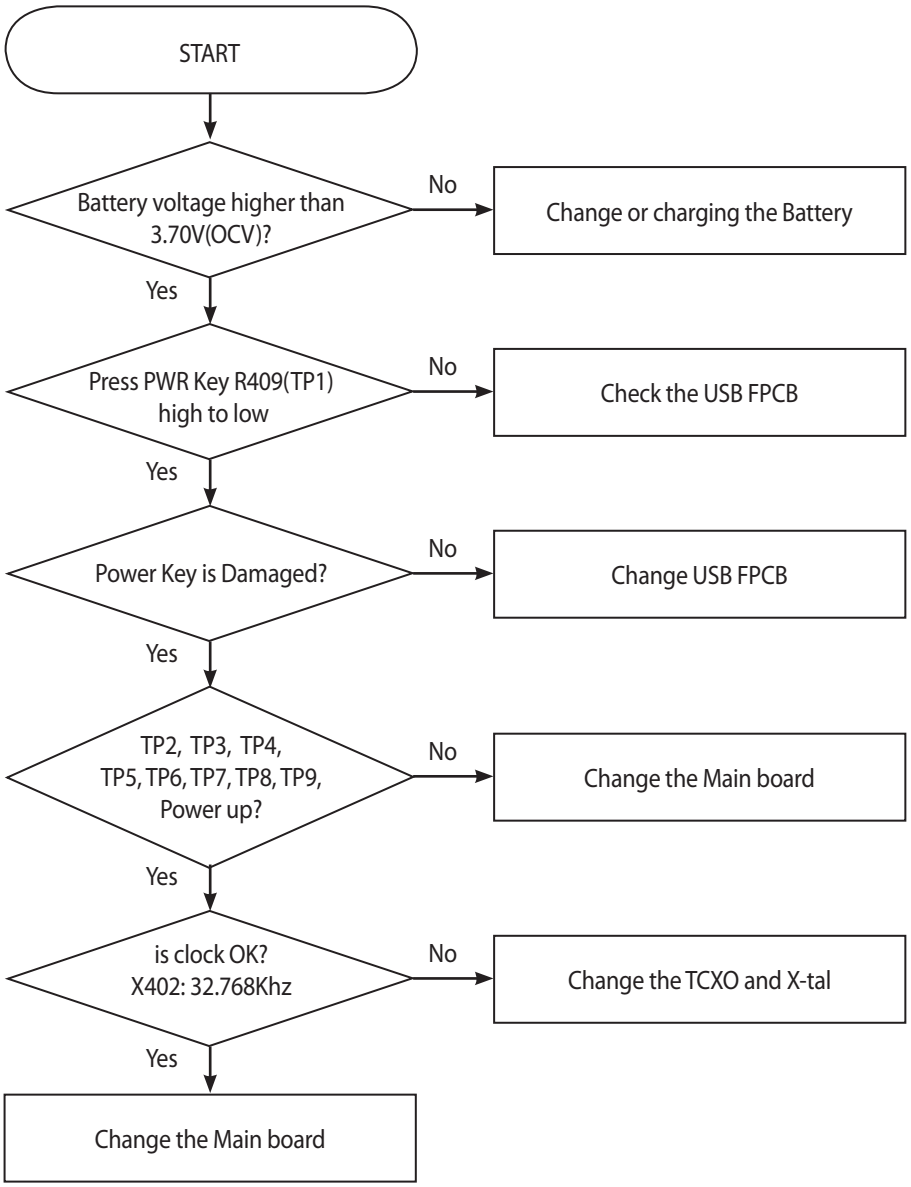
4.9 Power ON troubleshooting

The main power source of LGP970 is provided by 2 chips which are TWL5034 and XMM6160 (Communication processor). Since XMM6160 only powers up normally when OMAP3630 is properly powered therefore, TWL5034 are the actual ones to take look at.

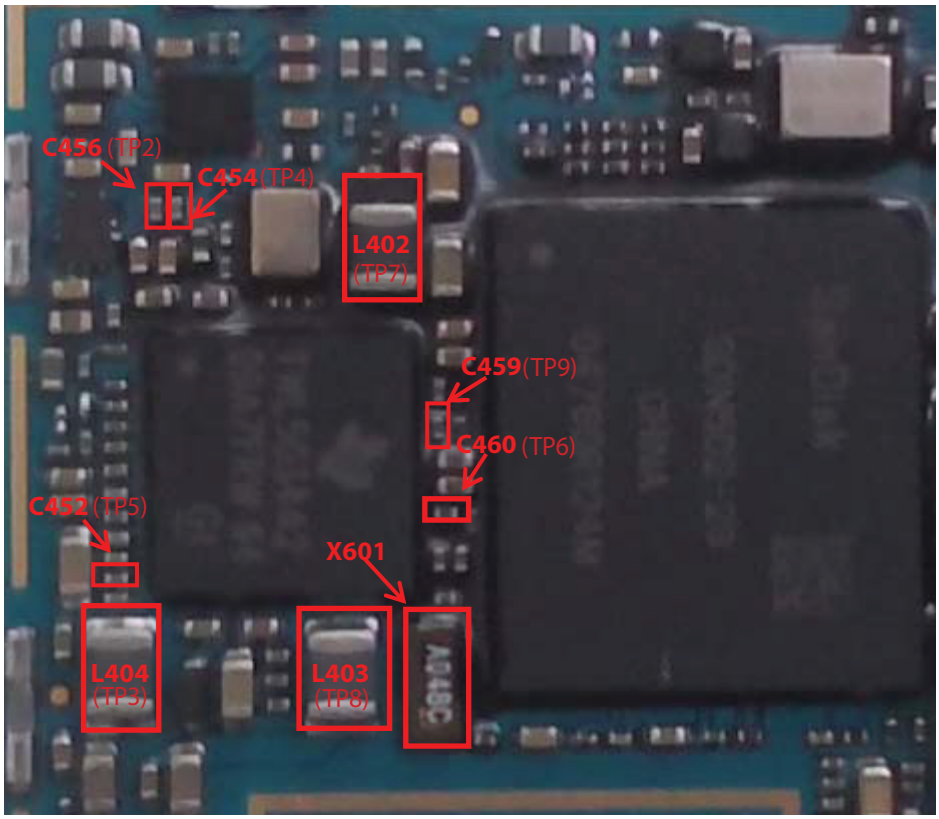
Power ON sequence of LGP970 is,

PWR key press → PM_ON_SW_N go to low (R409(TP1), TWL5034 POWER_ON_SW_ pin(A11)) →TWL5034 Power Up → REGEN → 1.8V_MMC_EN(C456_TP2) → 1.8V_VIO(L404_TP3), 1.8V_CSI2(C454_TP4), 3.0V_MOTION (C452_TP5), 1.8V_AUDIOAMP(C460_TP6) → VDD1_CORE(L402_TP7) → VDD2_CORE(L403_TP8) → 1.8V_VPLL1(C459_TP9) → OMAP_PWR_RESET goes high!

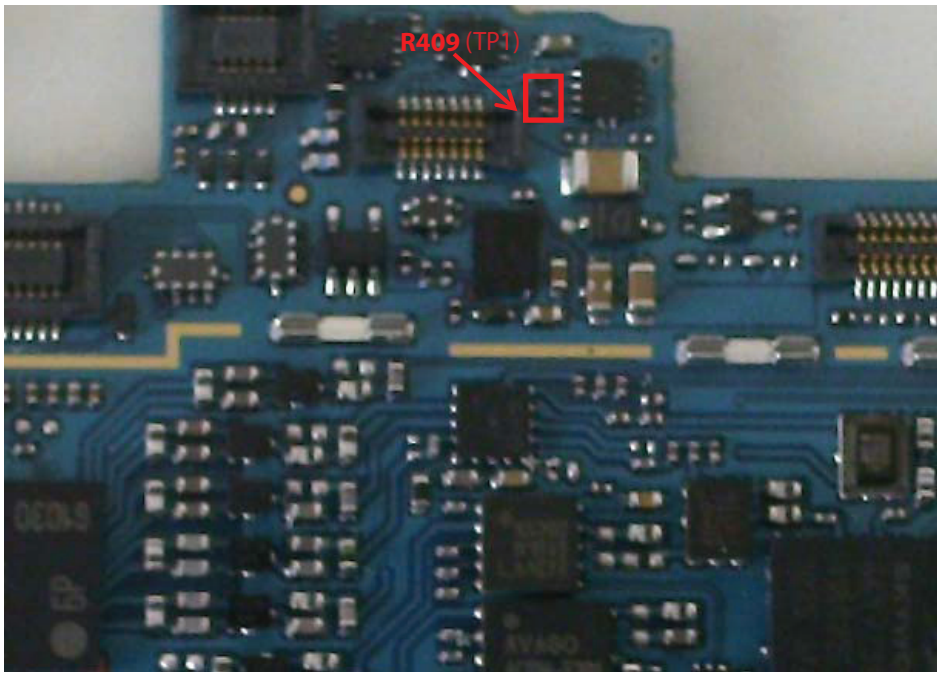




BOTTOM view of LGP970

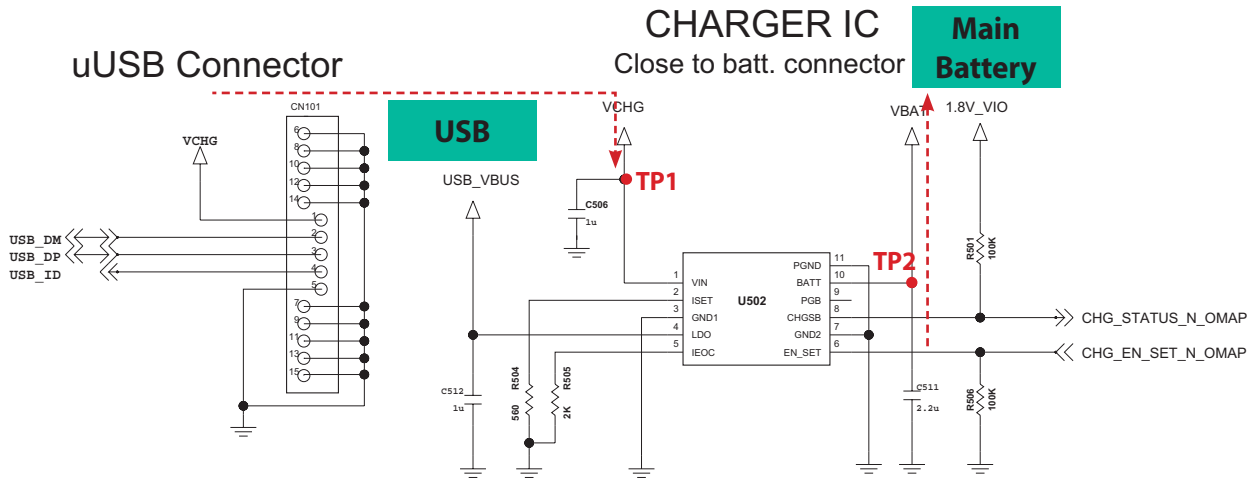


TOP view of LGP970



4.10 Charger Troubleshooting

Since LGP970 micro USB is located at the TOP of the terminal set, charging current flows via USB FPCB.
The charger IC accepts the current and maximum charging current is set around 945mA.



Check Point

- Connection of TA or USB Cable
- Charging current path(RT9524)
- Battery

Troubleshooting Setup

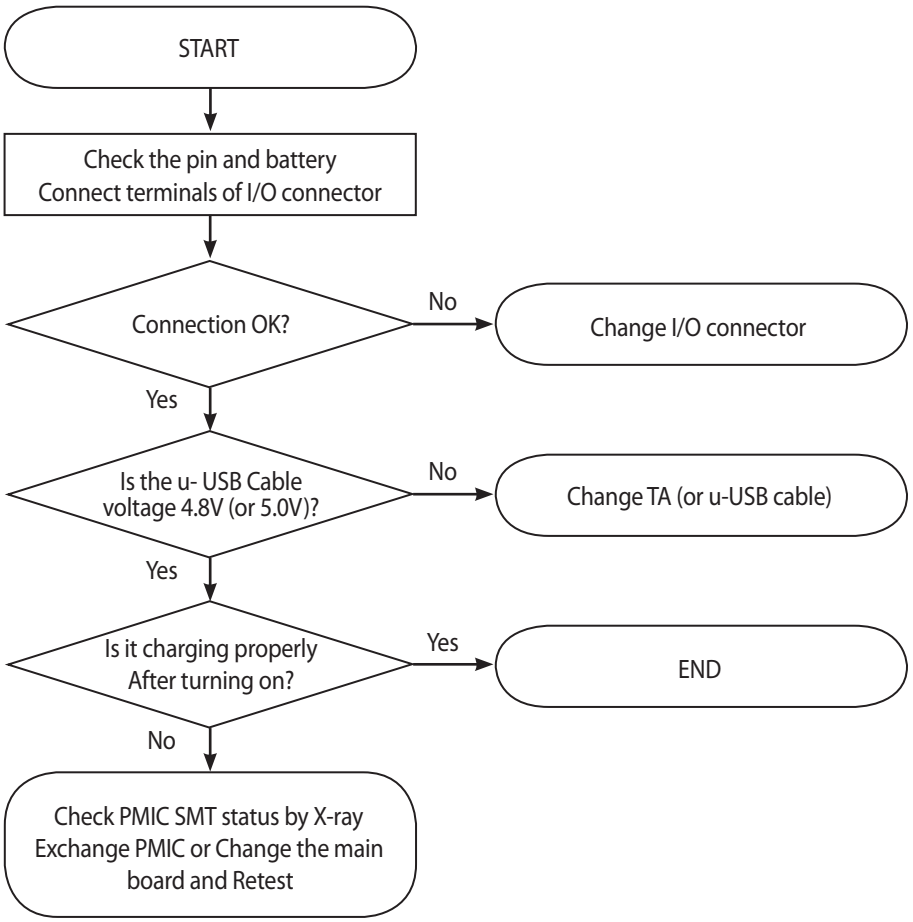
- Connect TA and battery to the phone

Charging Procedure

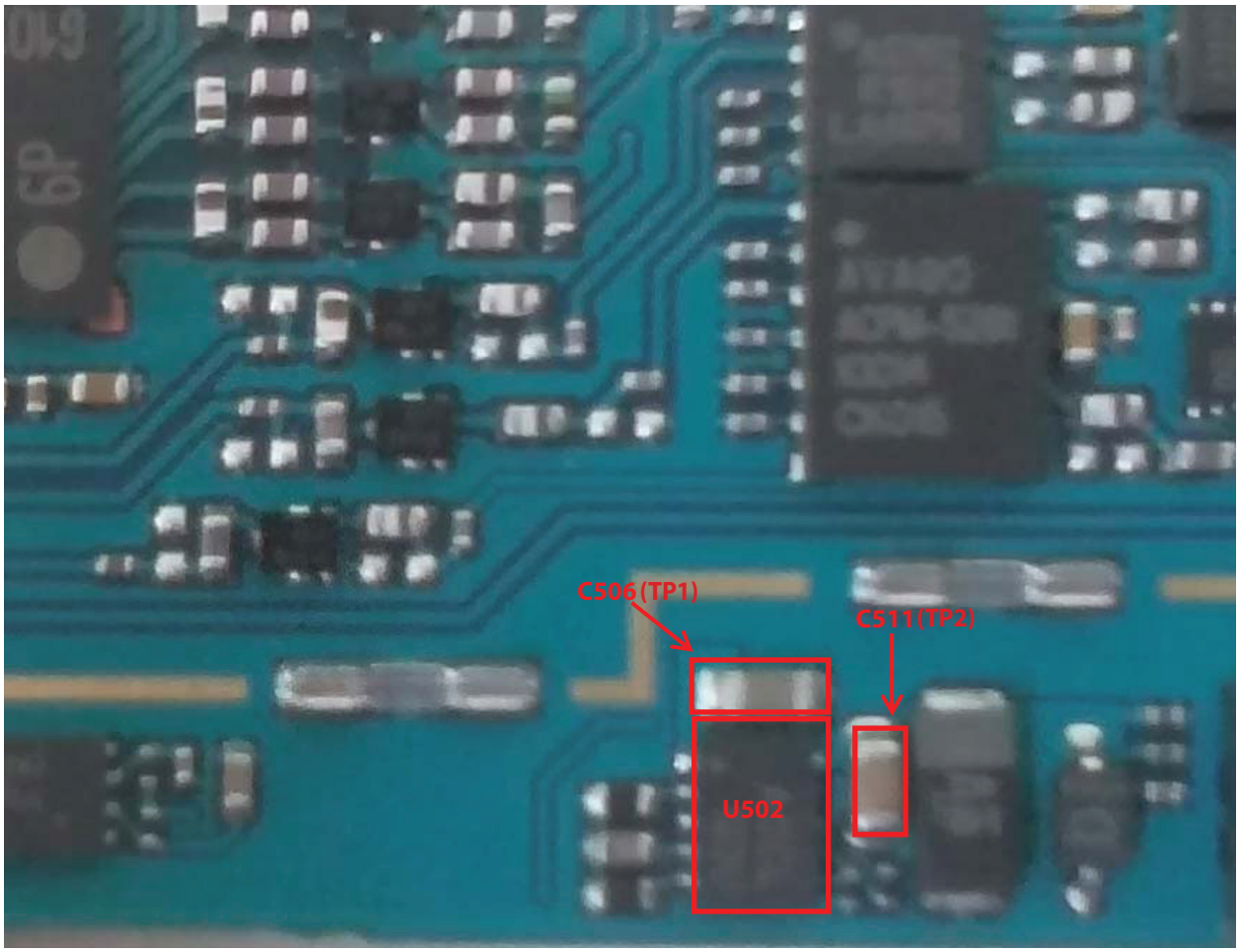
- Connect TA or u-USB Cable
- Control the charging current by RT9524 IC
- Charging current flows into the battery

Troubleshooting Procedure

- Check the charger (TA or USB Cable) connector



TOP view of LGP970

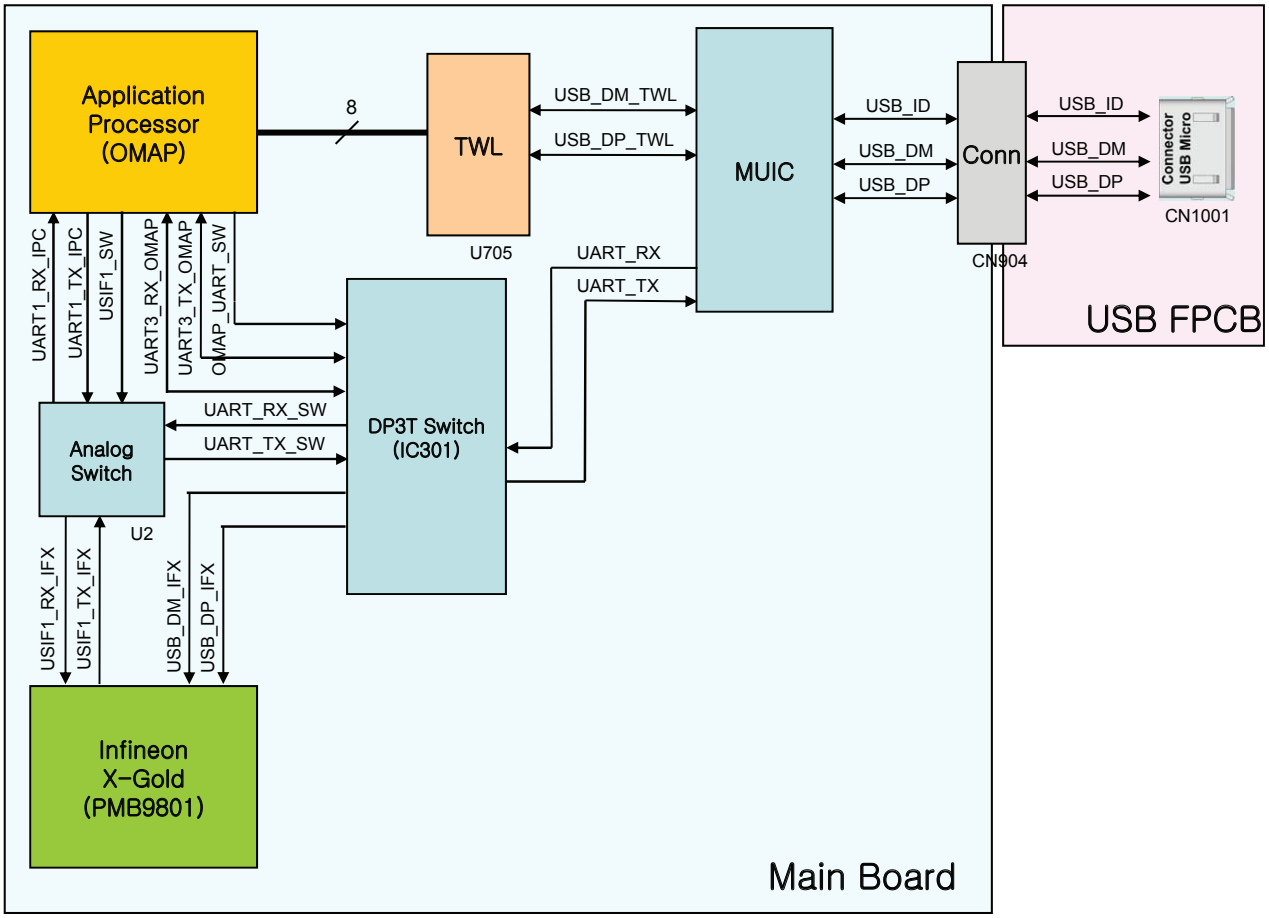


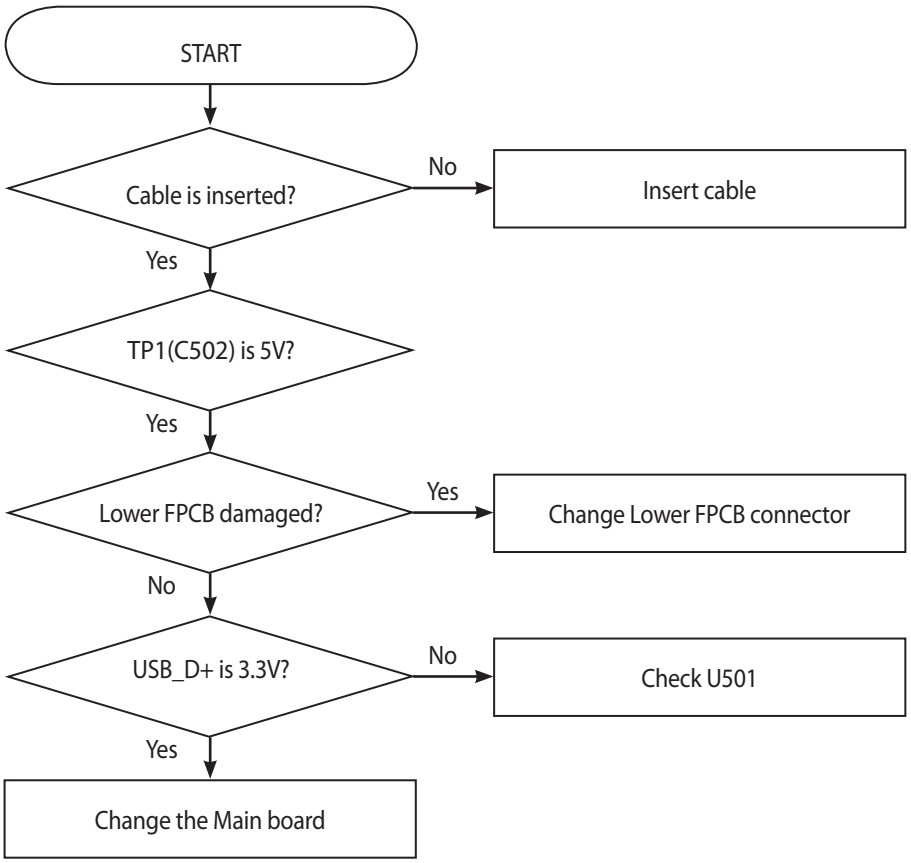
4.11 USB Trouble shooting

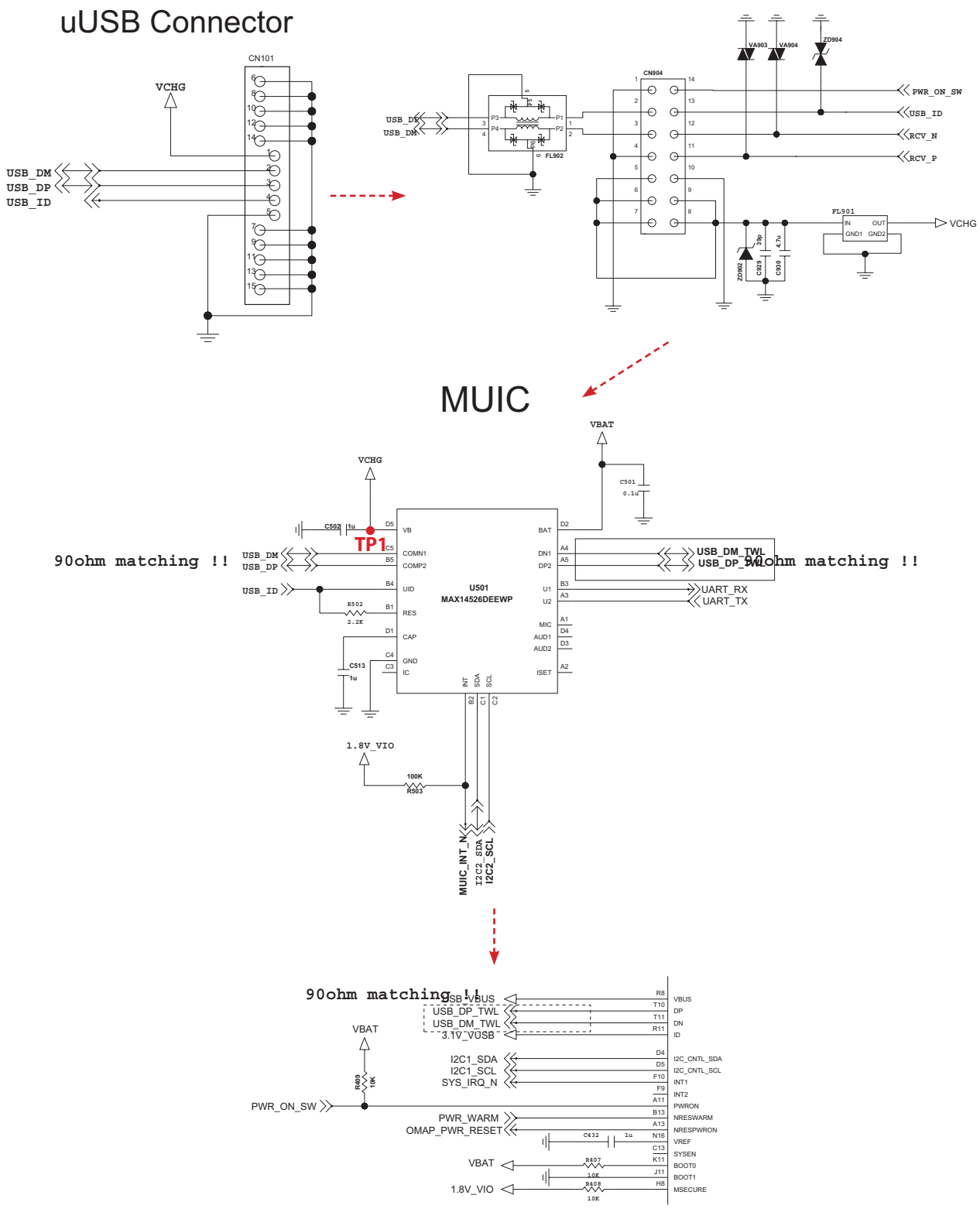
The sequence of LGP970USB is,

USB connected to LGP970 → USB_OUT_5V goes to 5V(FPCB) → USB_D+ go to 3.3V → USB_DATA is triggered → USB work

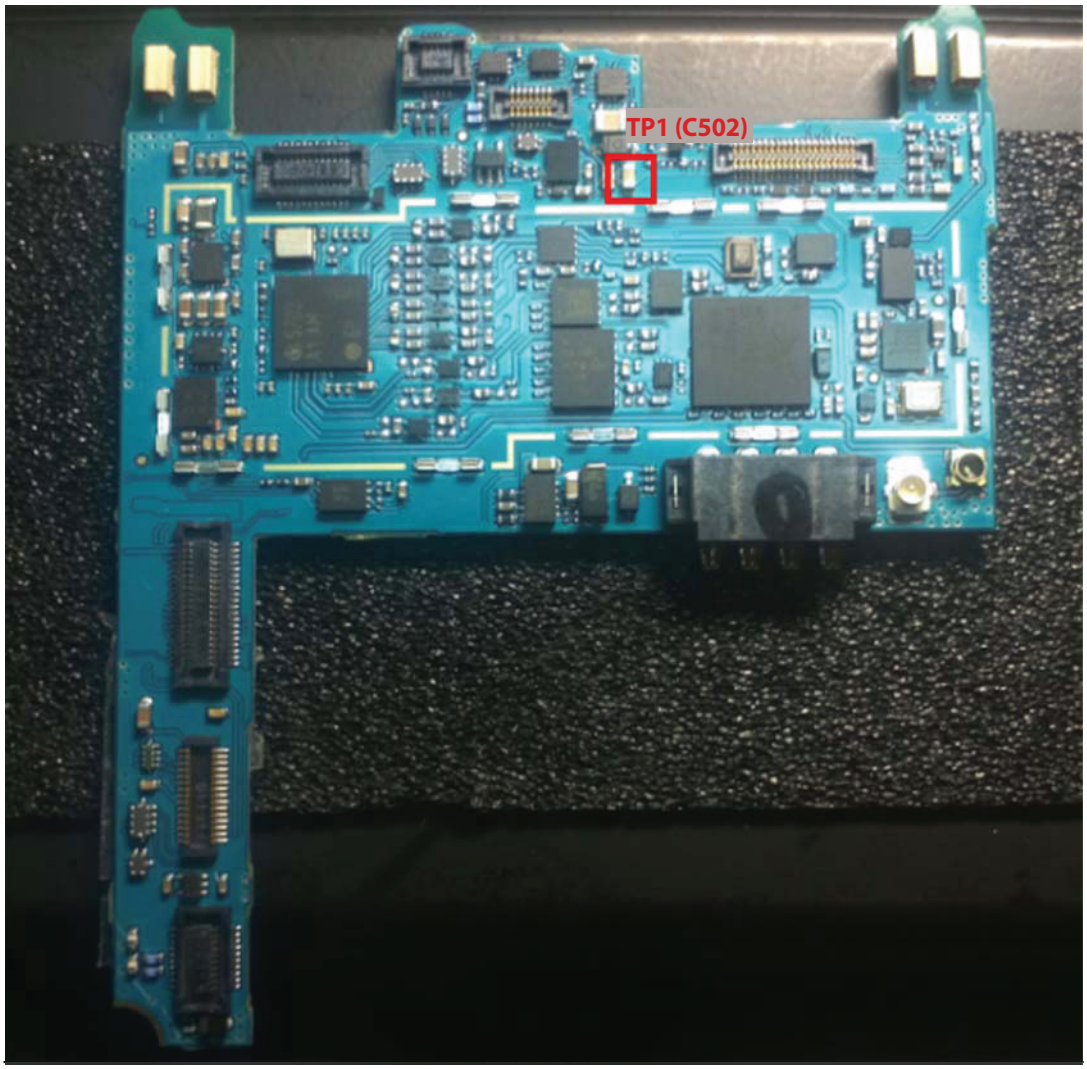
Block Diagram of USB & UART connection is shown below







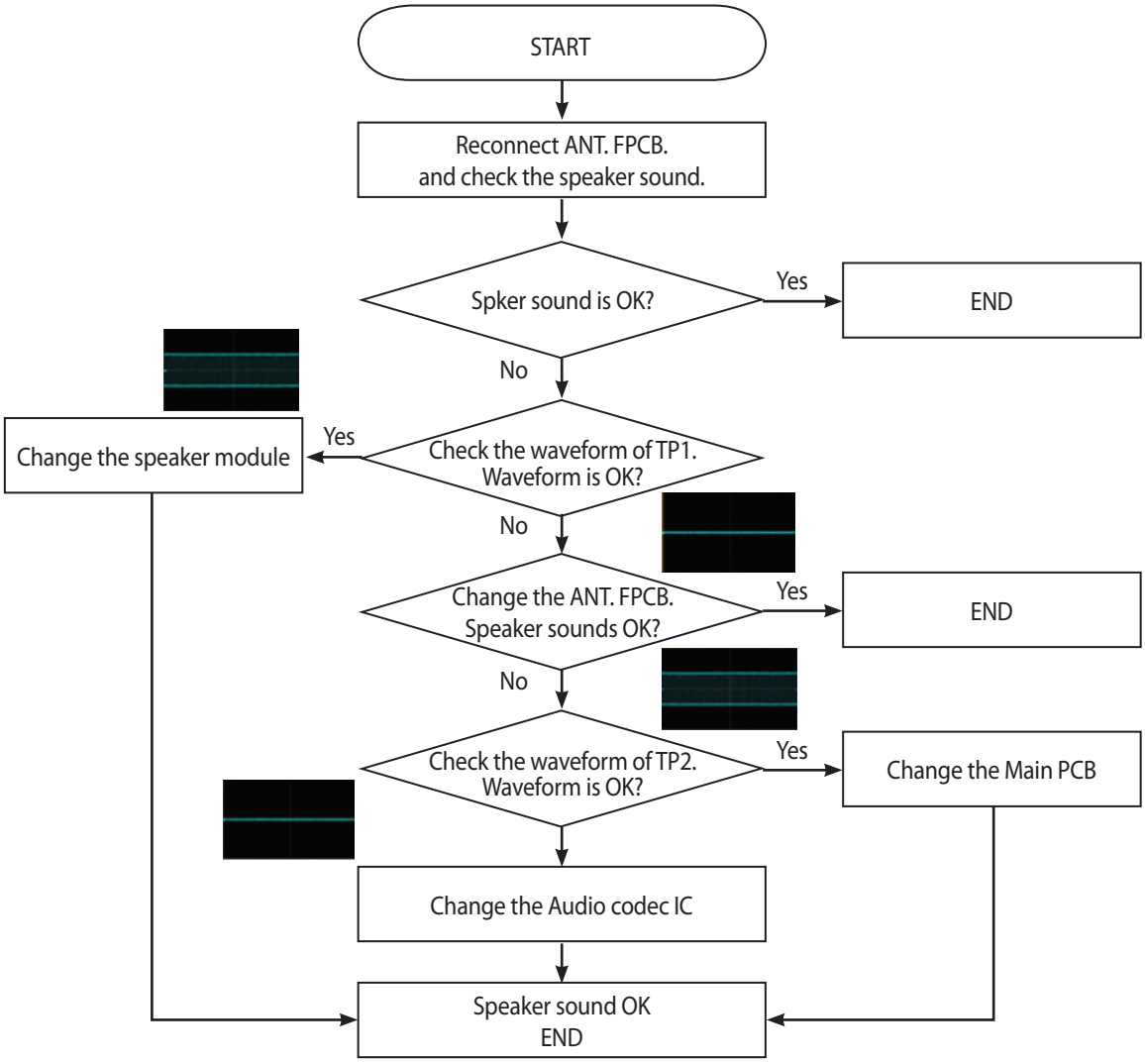
C520 (USB_VBUS)

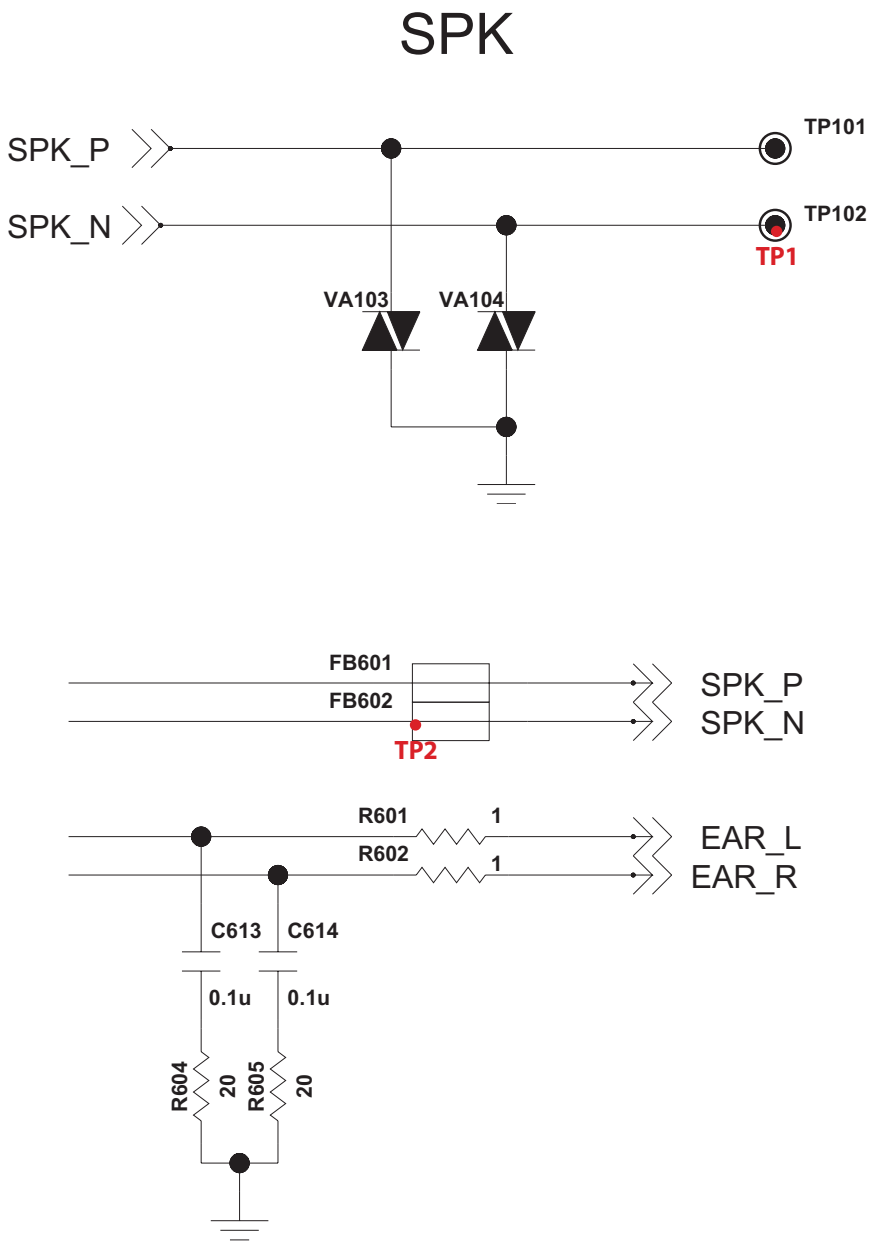


4.12 Audio trouble

4.12.1 Speaker troubleshooting

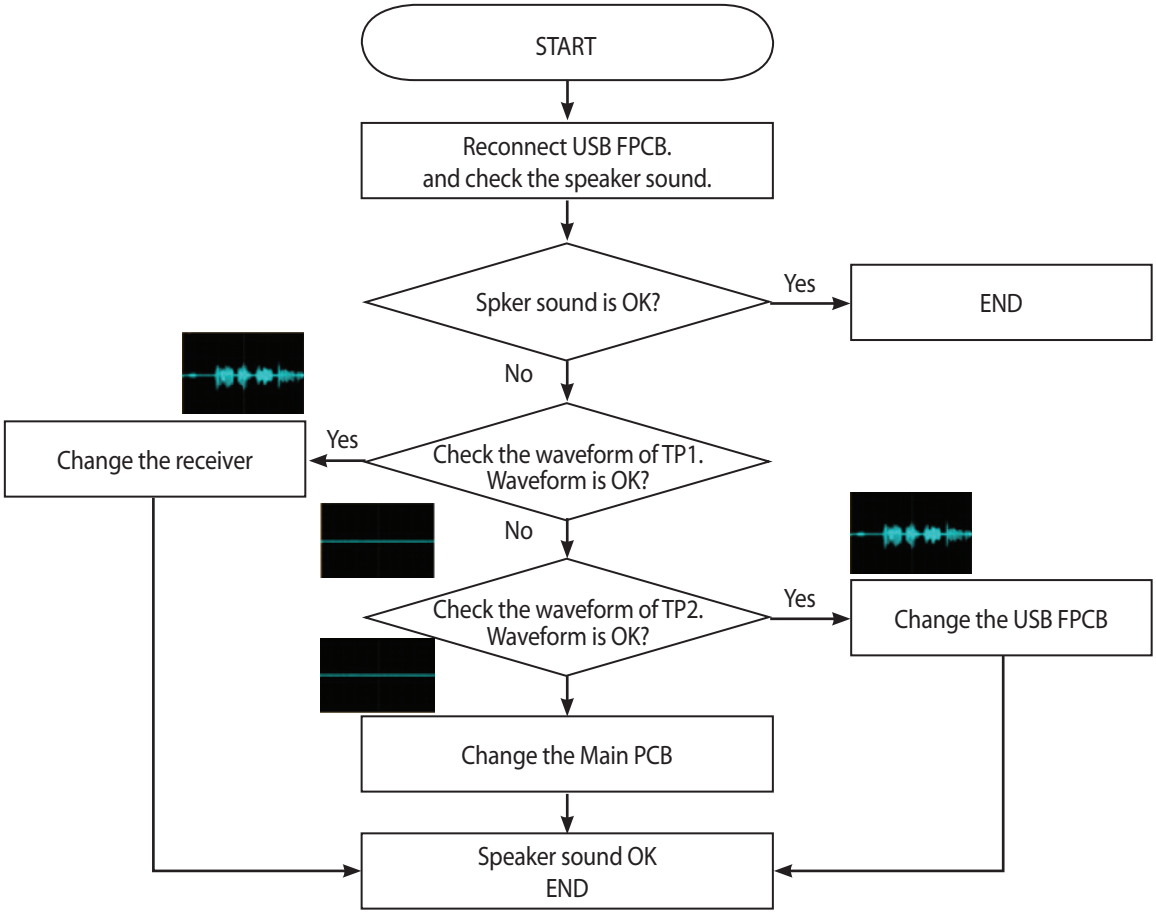
Speaker control signals are generated by TWL5034 (U402), amplified by WM9093 (IC601), and Power is supplied by Battery (VBAT).

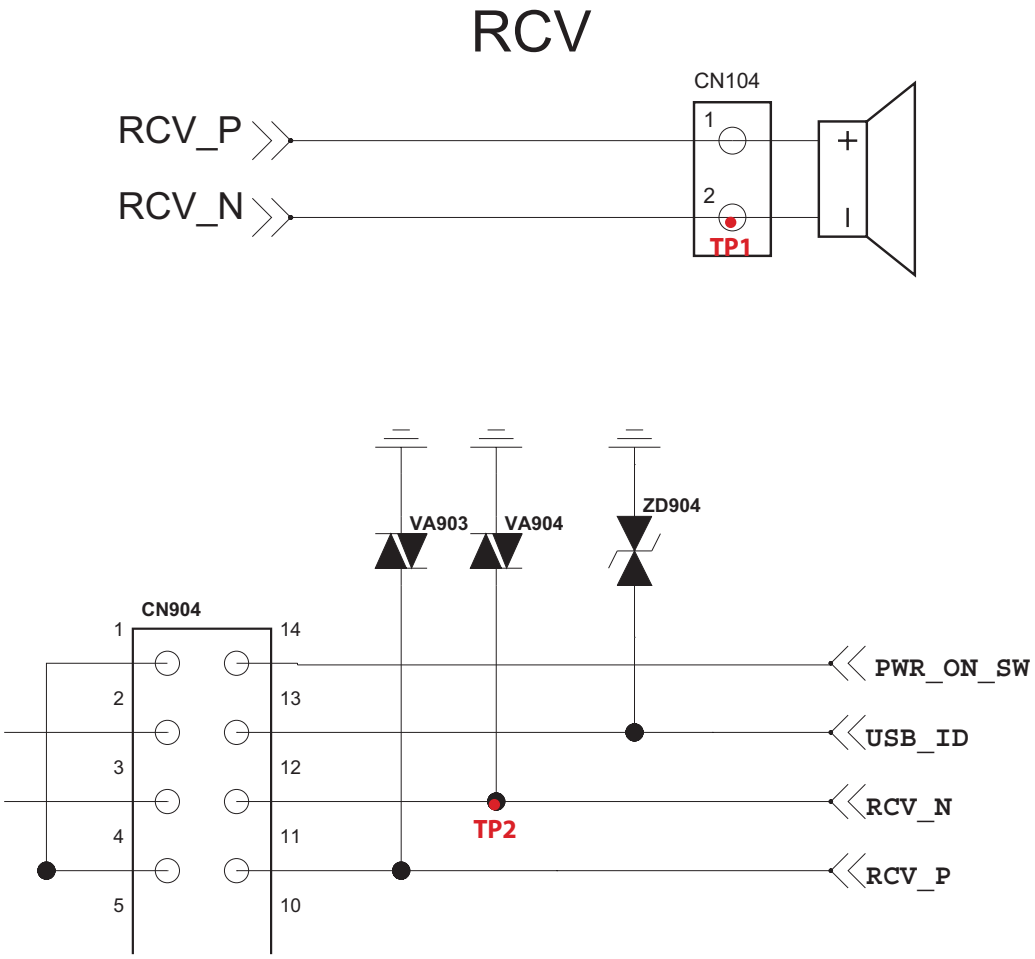




4. 12.2 Receiver troubleshooting

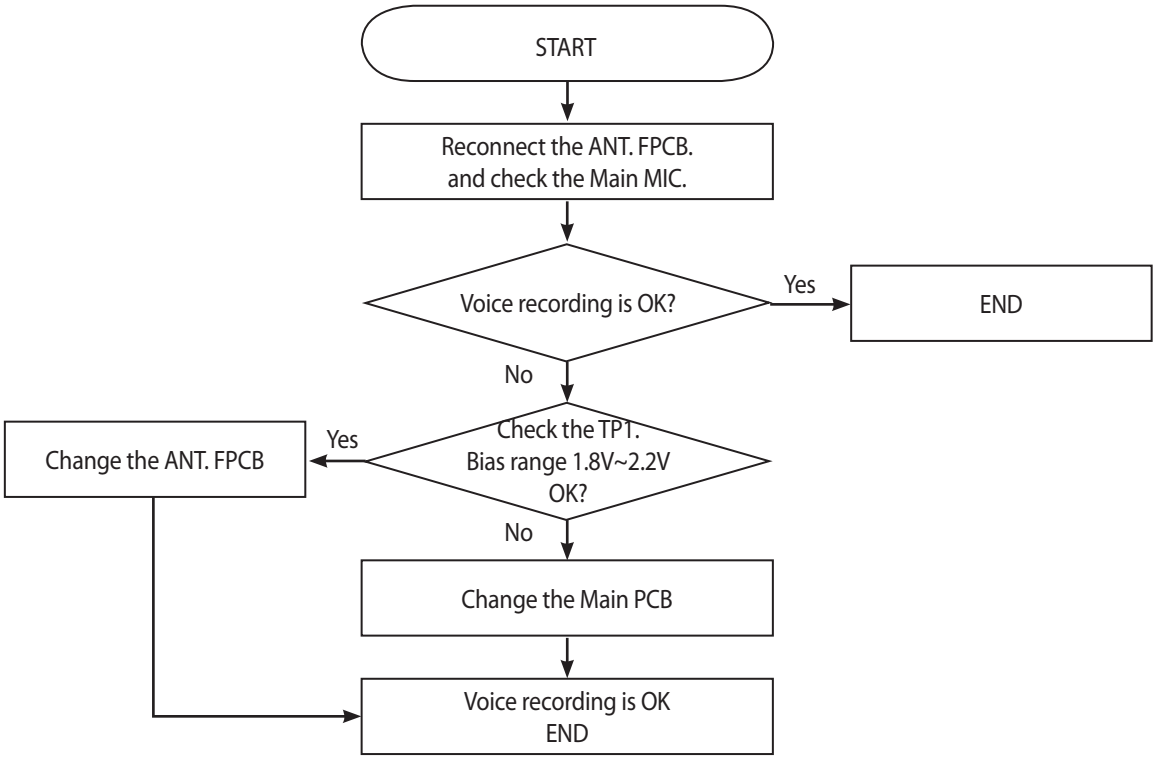
Receiver control signals and power are generated by TWL5034 (U402).



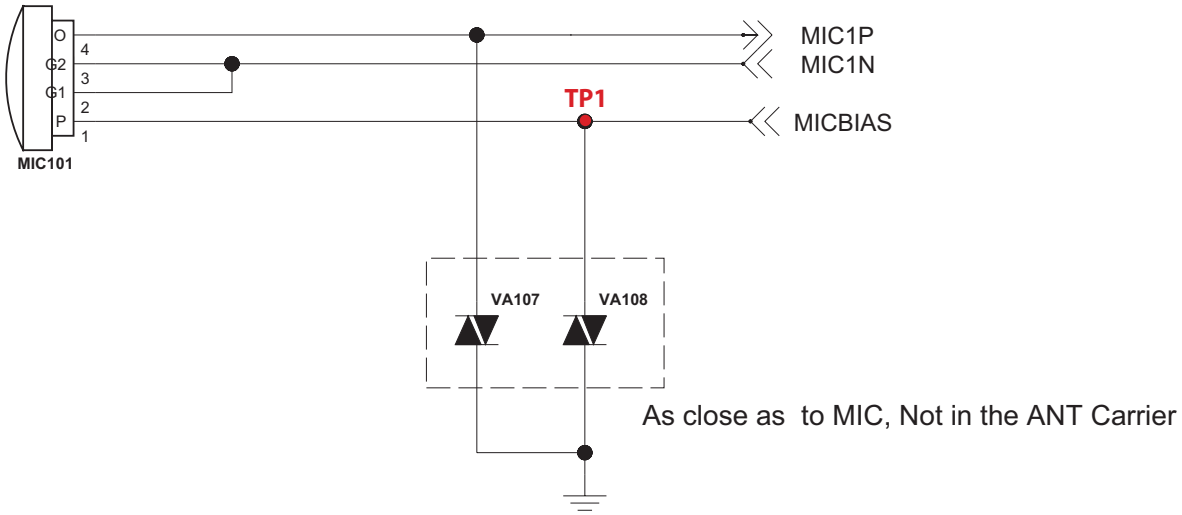


4.12.3 Main MIC troubleshooting

Main MIC control signals and power are generated by TWL5034 (U402).

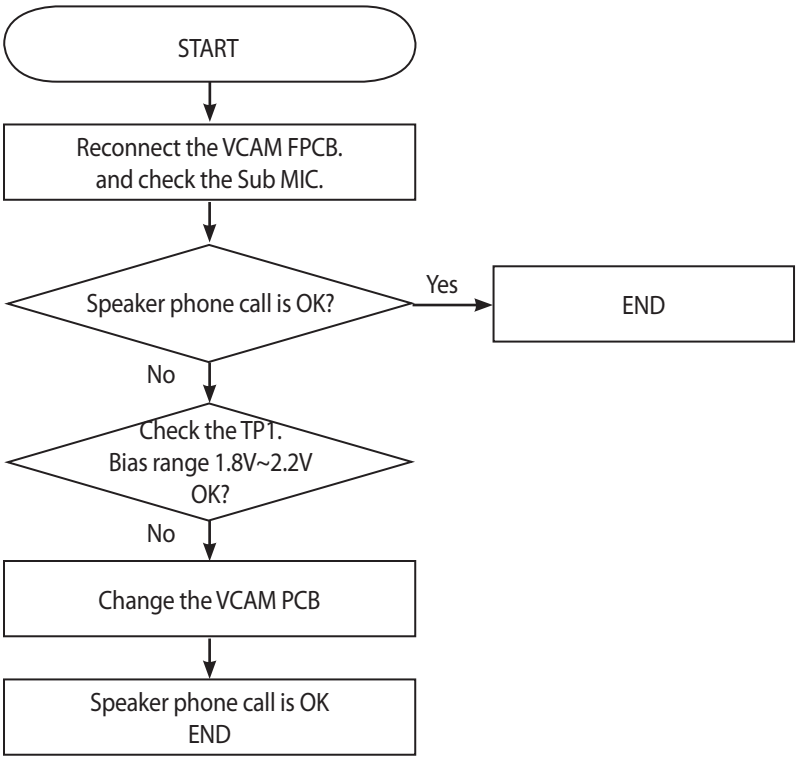


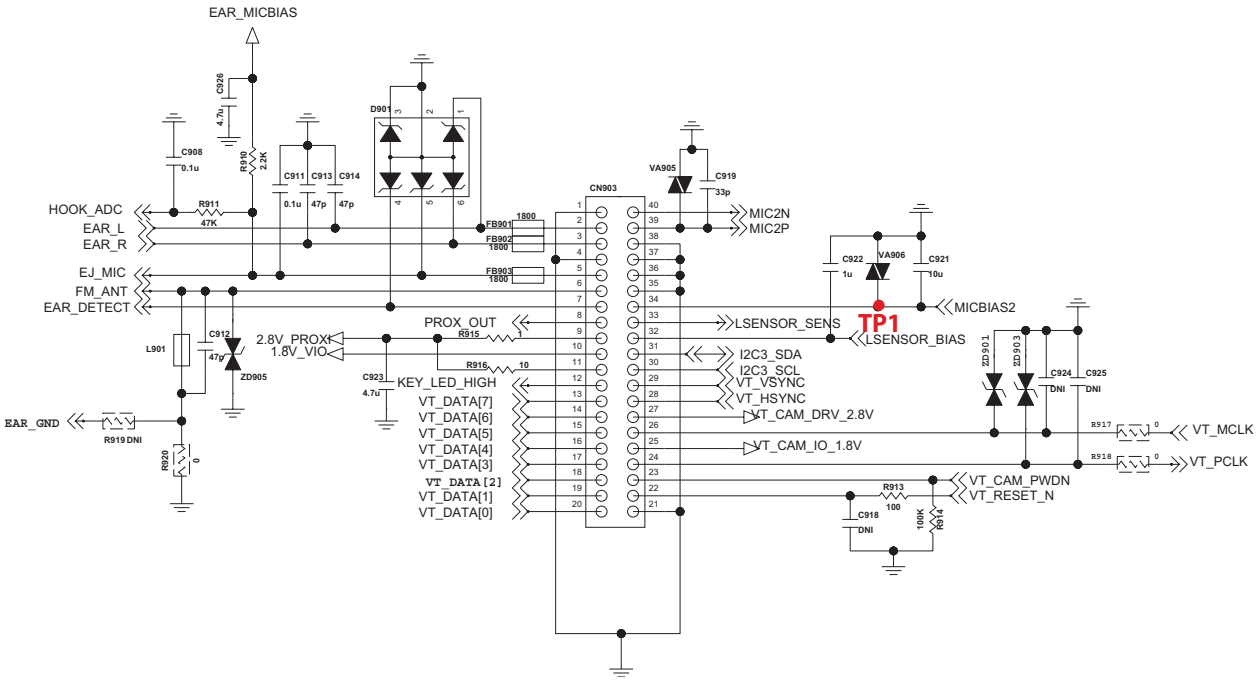
Main MIC



4.12.4 SUB MIC troubleshooting

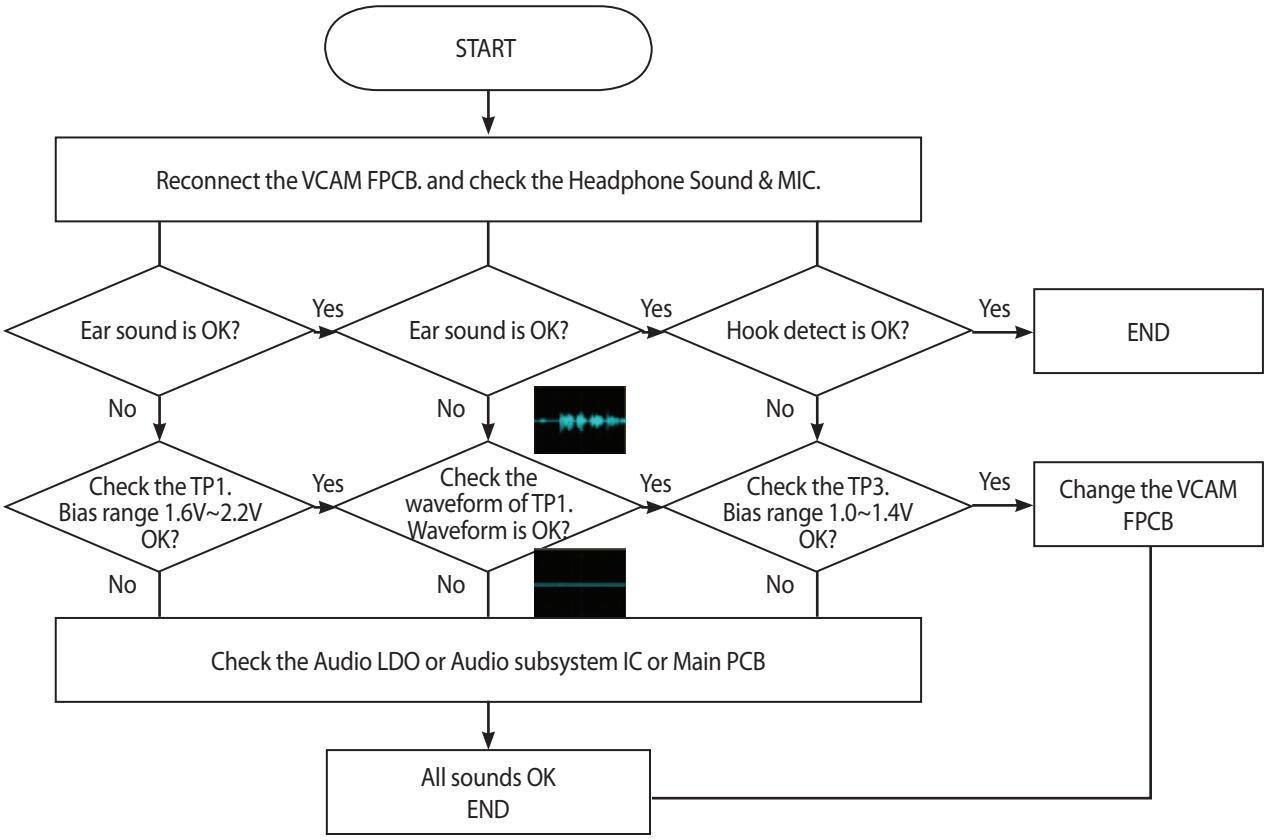
Sub MIC control signals and power are generated by TWL5034 (U402).



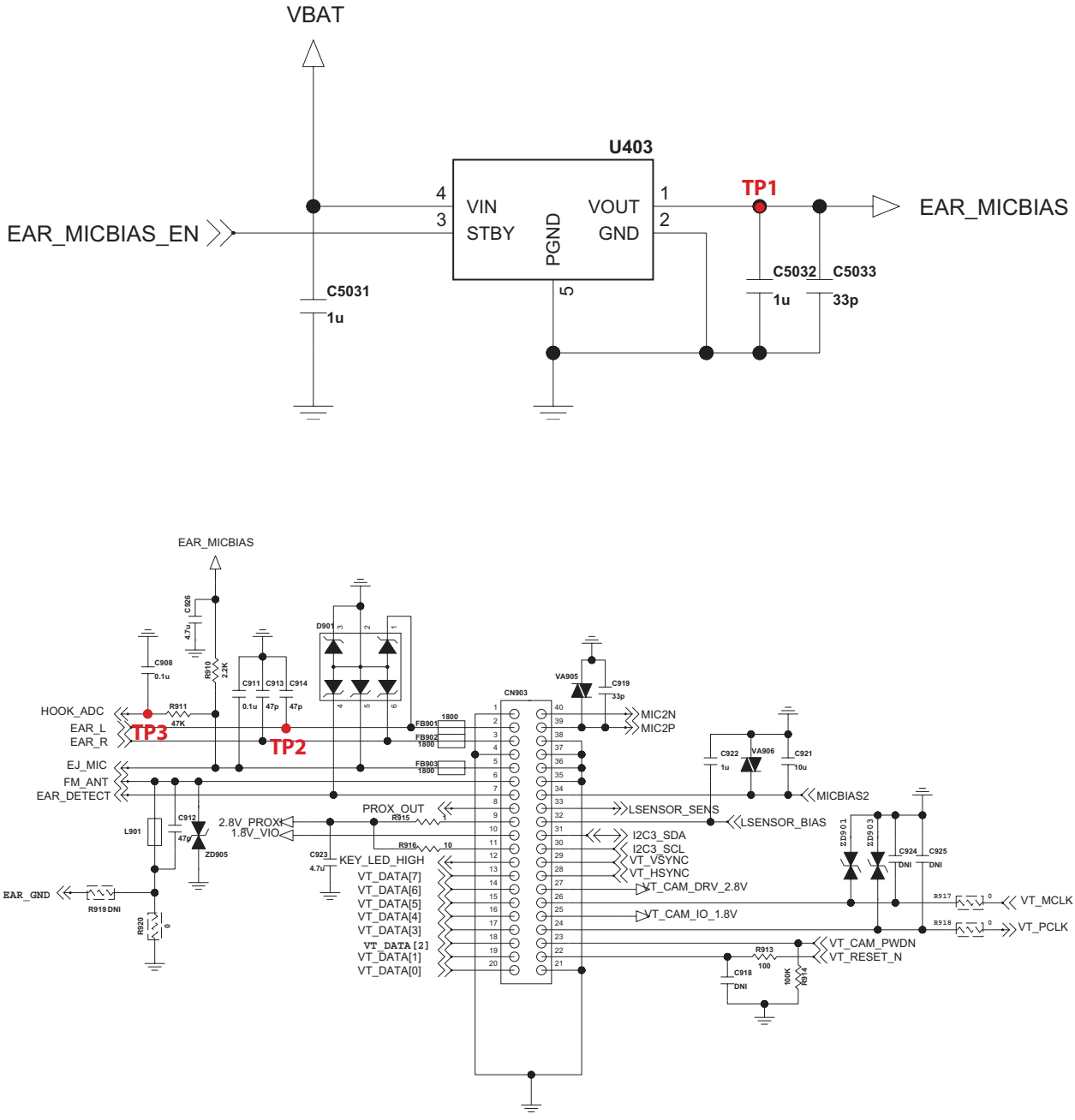


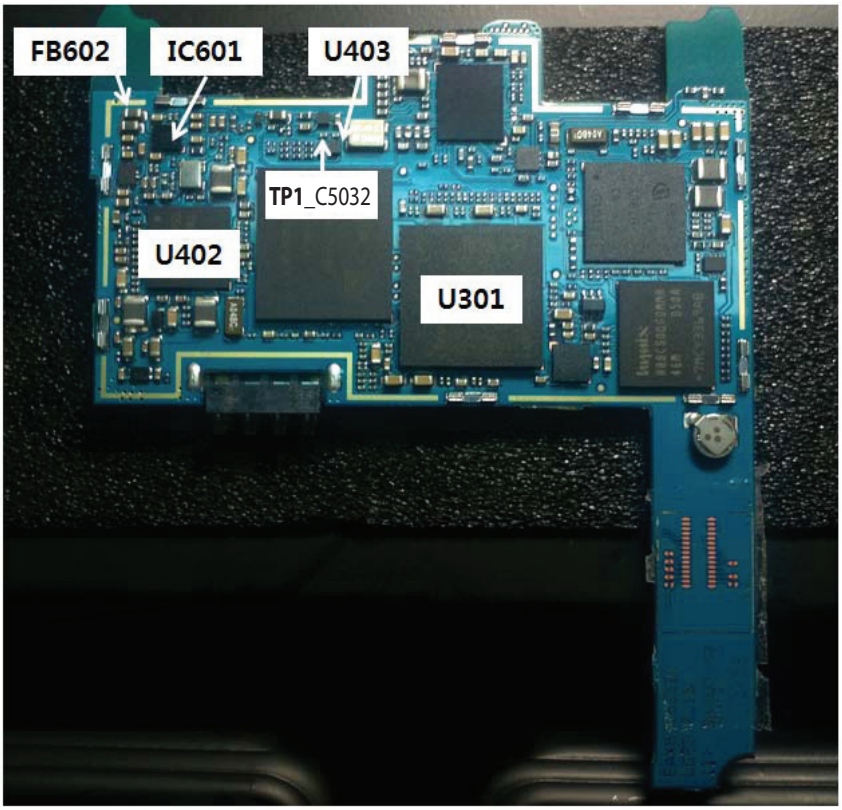
4.12.5 Ear-MIC troubleshooting

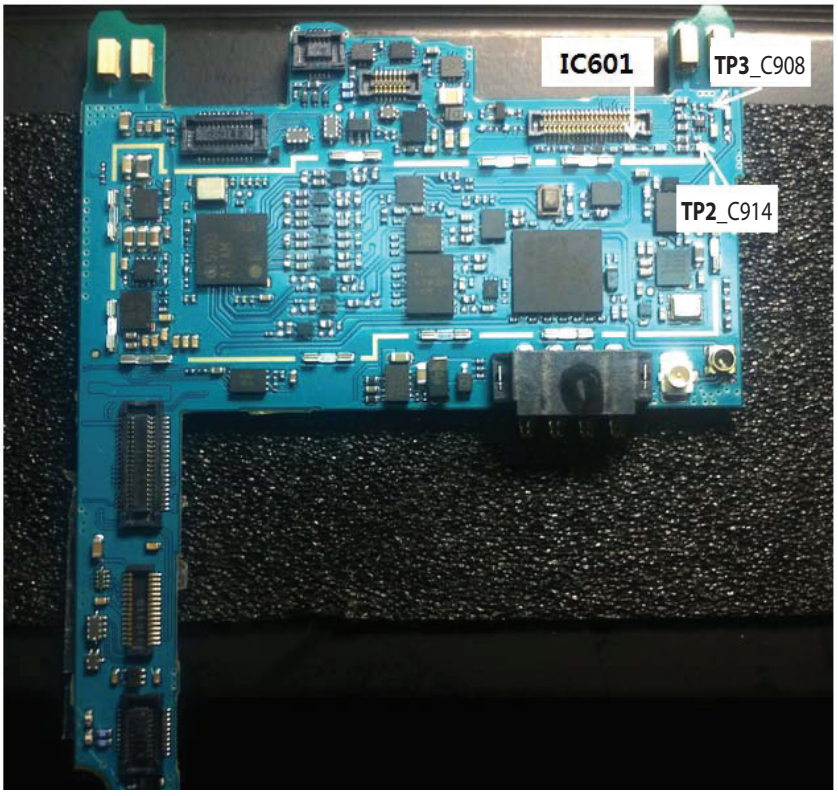
Ear MIC control signals are generated by TWL5034 (U402), amplified by WM9093 (IC601). The power is generated by external LDO (U403) which is controlled by OMAP3630 (U301).



AUDIO LOD

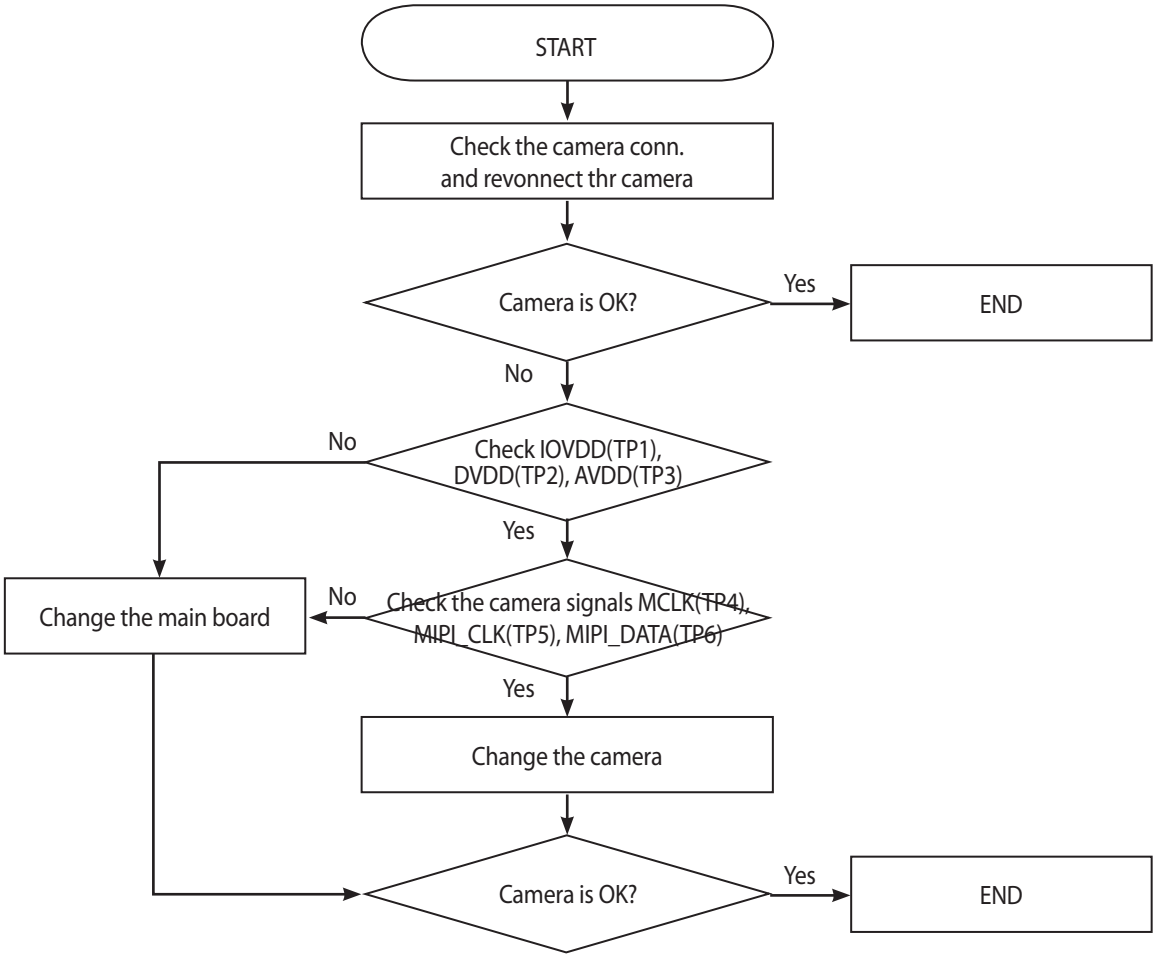


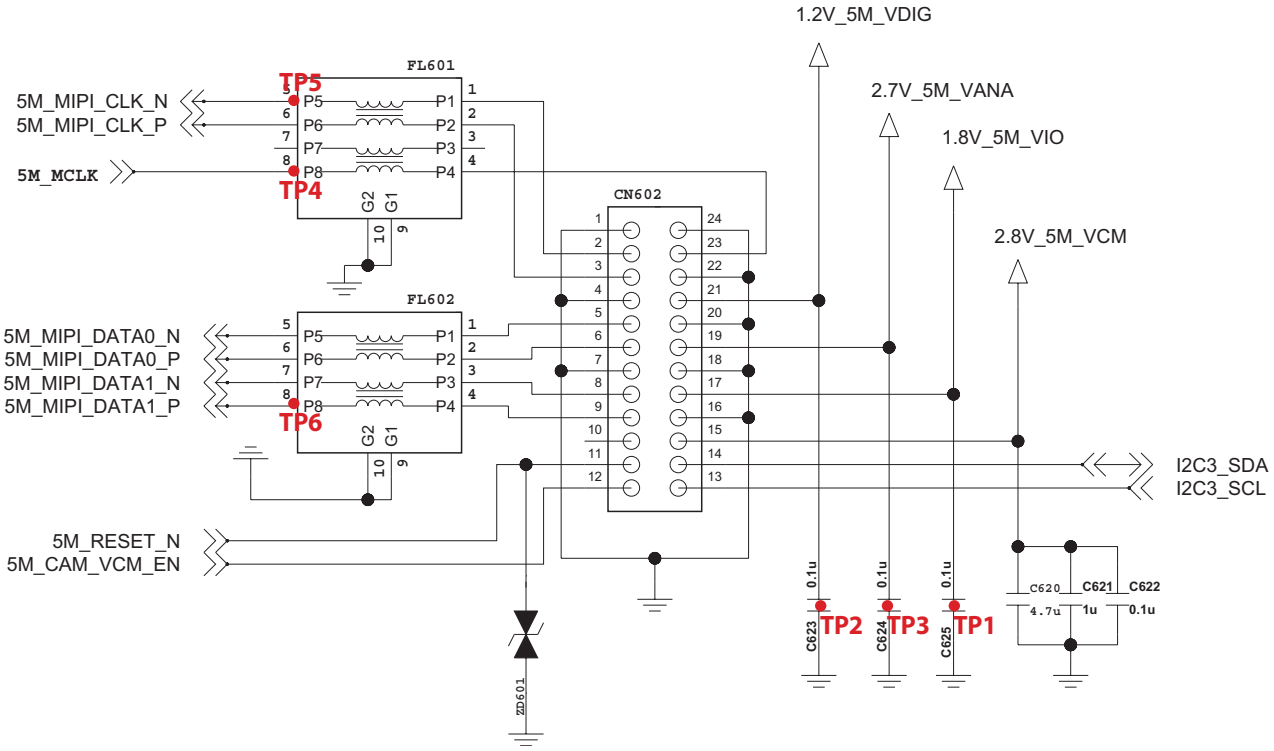




4.13 Camera troubleshooting

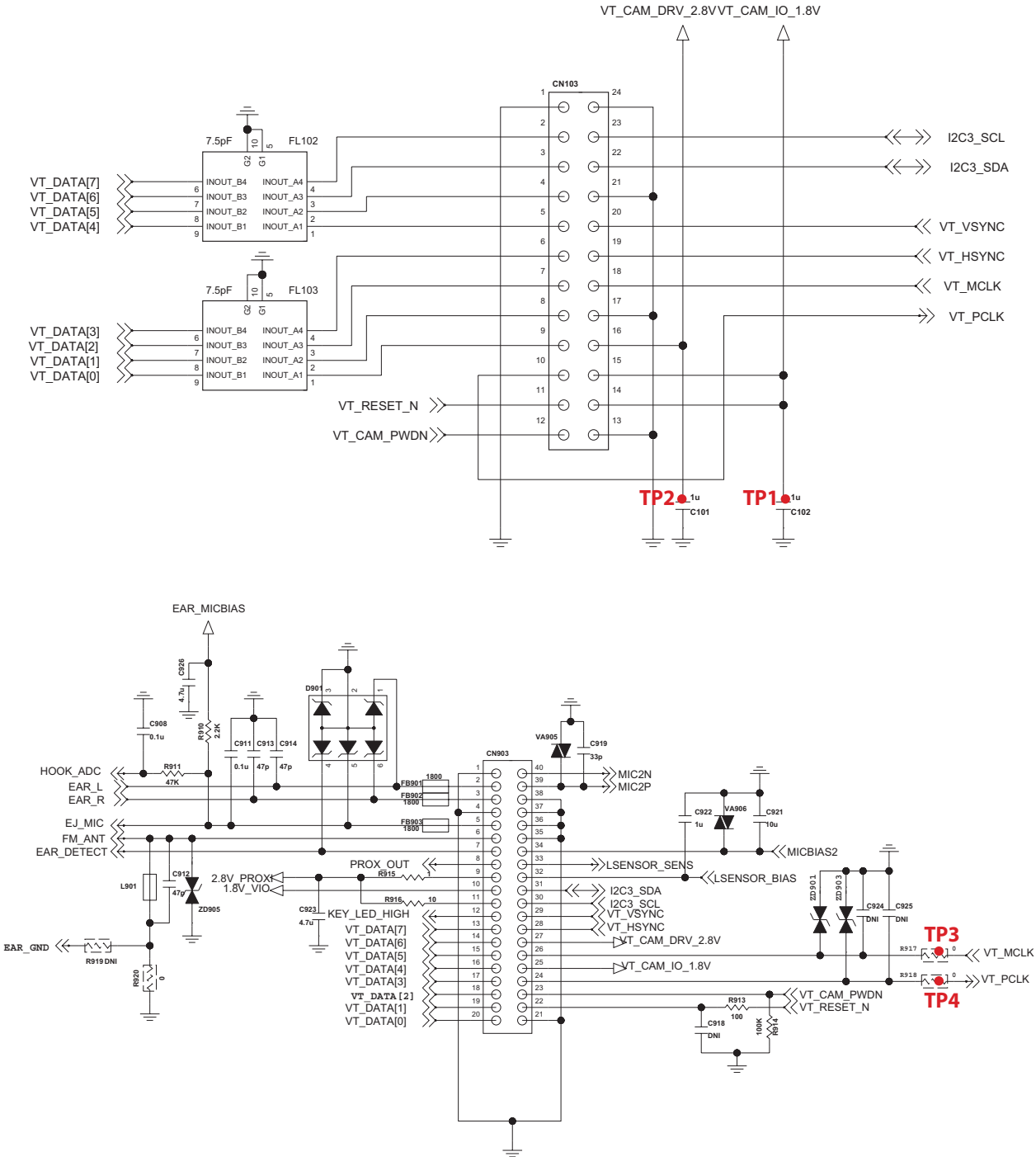
5M camera control signals are generated by AP_OMAP3630(U301), and Power is supplied by LP8720(U601)





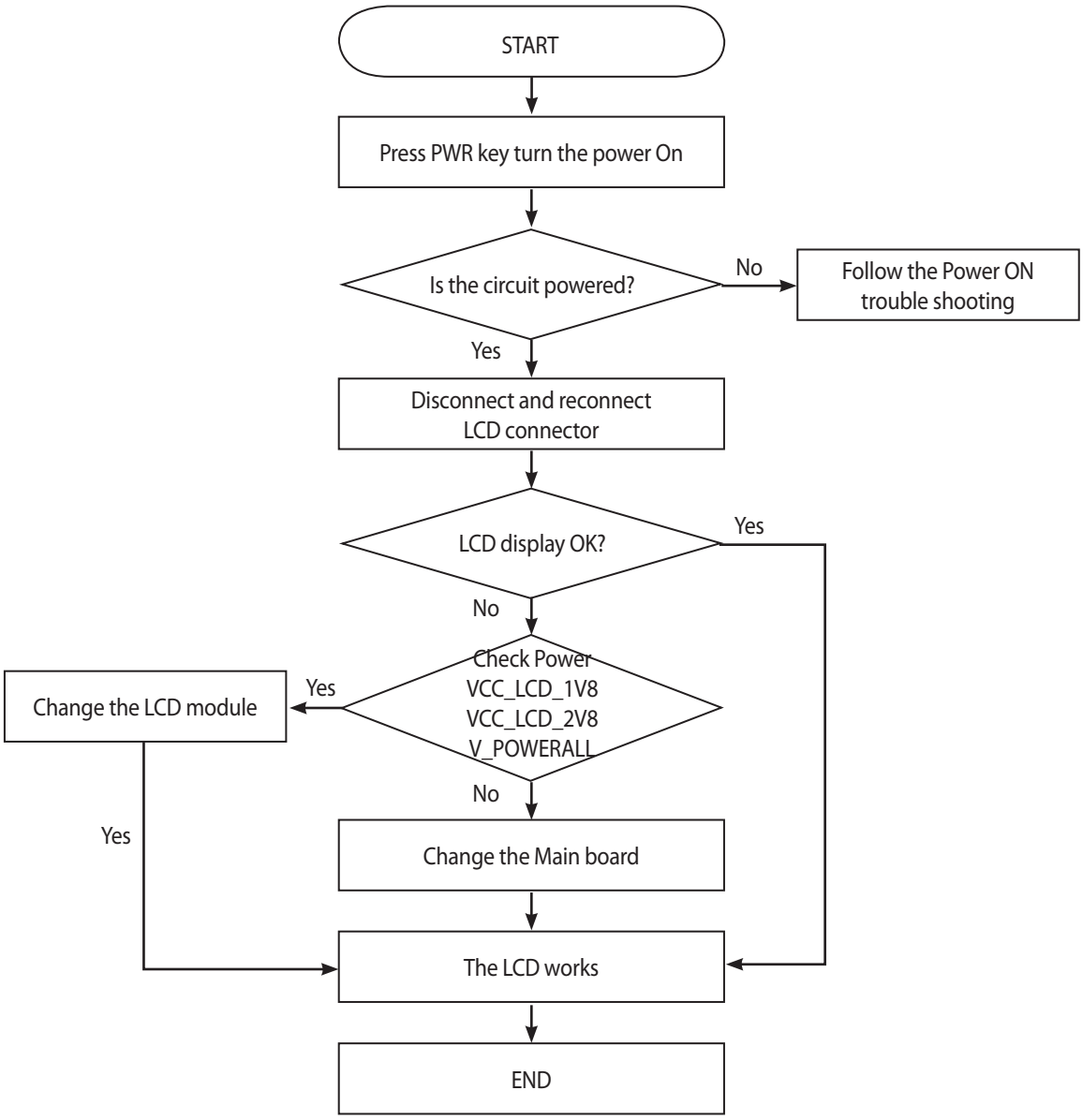
4.13.1 Sub 2M Camera troubleshooting

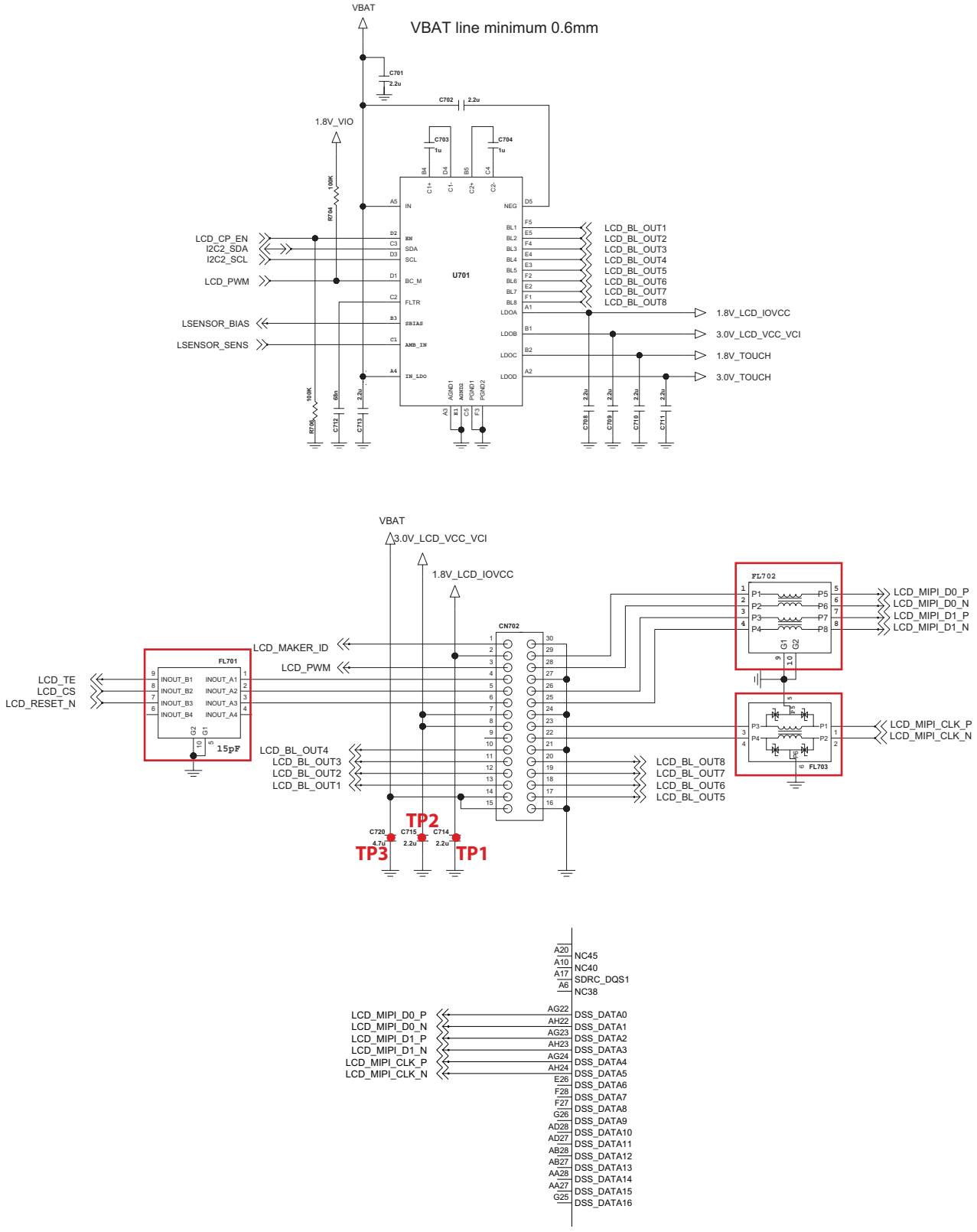
2M camera control signals are generated by AP_OMAP3630(U301), and Power is supplied by TWL5034(U402)

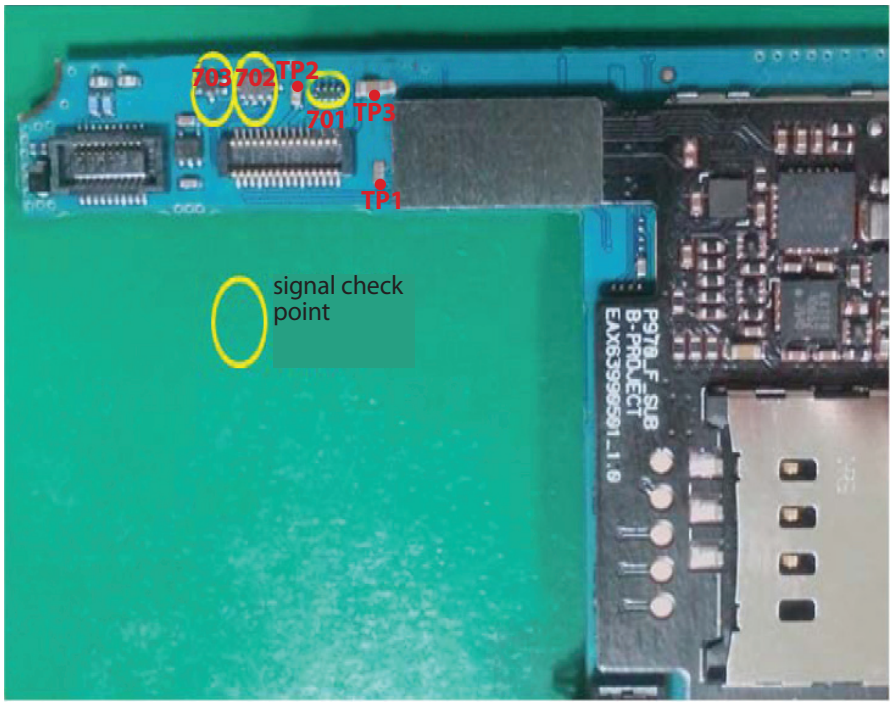


4.14 Main LCD trouble

Main LCD control signals are generated by OMAP3630. Those signal's path are : OMAP3630-> LCD Module





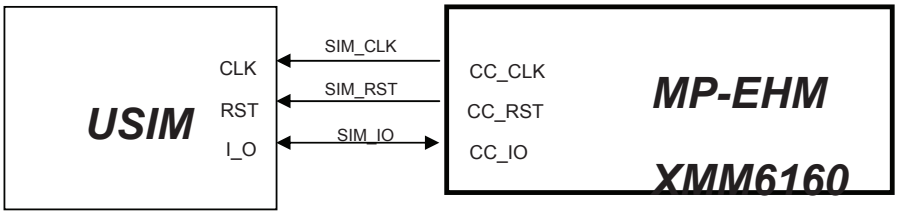


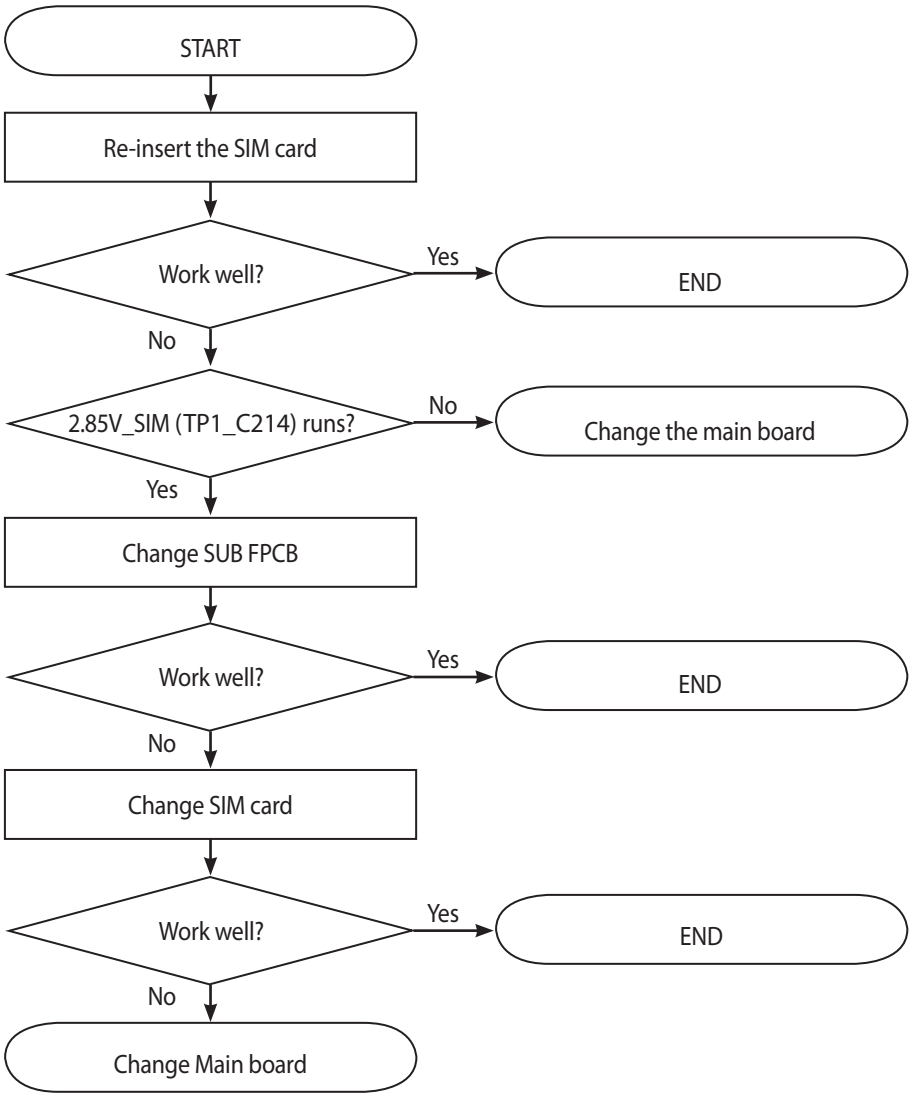
4.15 SIM detect Trouble shooting

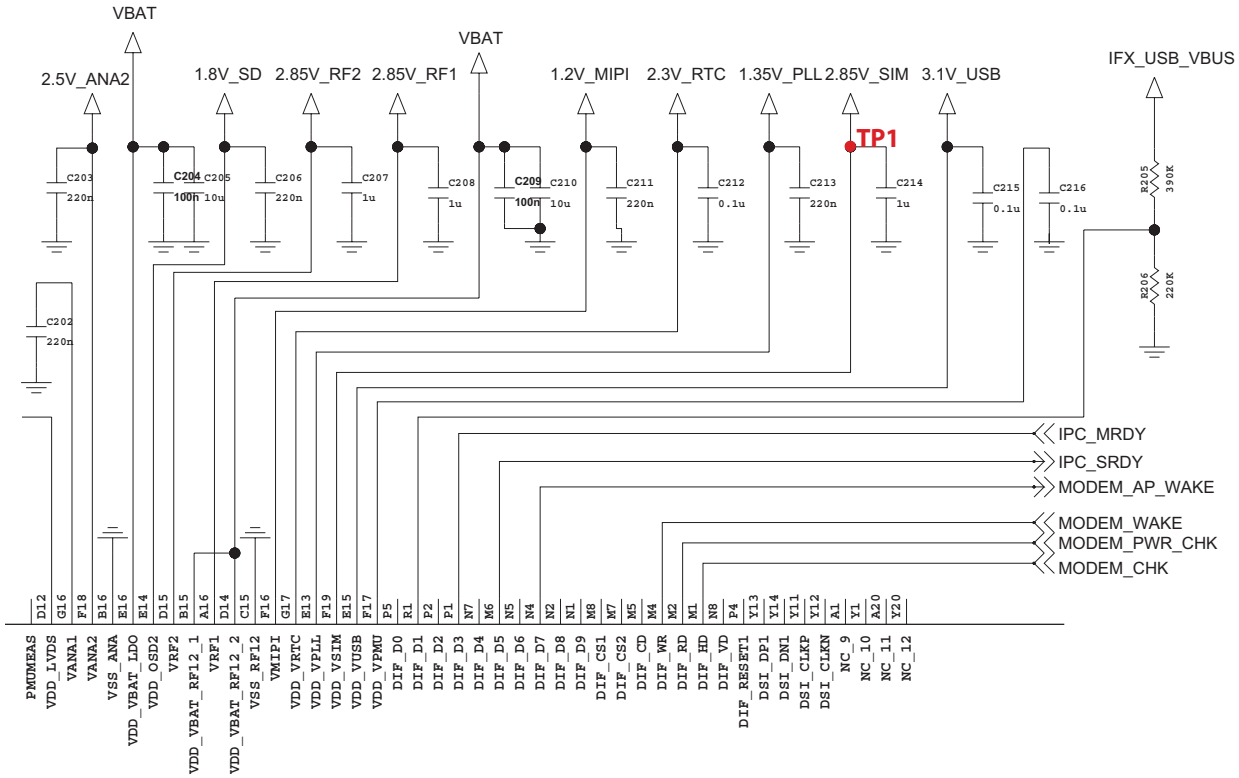
The sequence of detecting LGP970 SIM is,

SIM inserted to LGP970 → 2.85V_SIM goes to 2.85V(SUB FPCB) → Triggers SIM clock, reset and data.

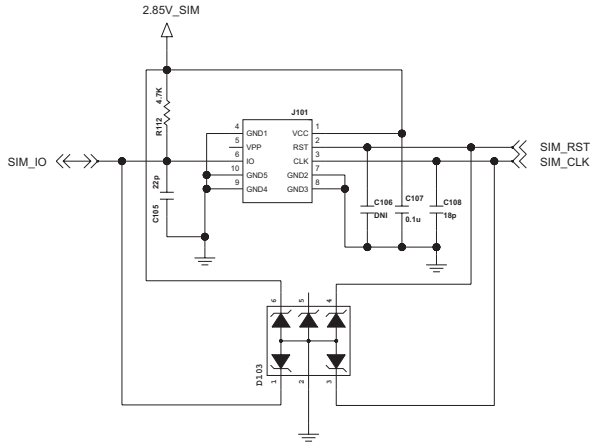
Block Diagram of USB & UART connection is shown below



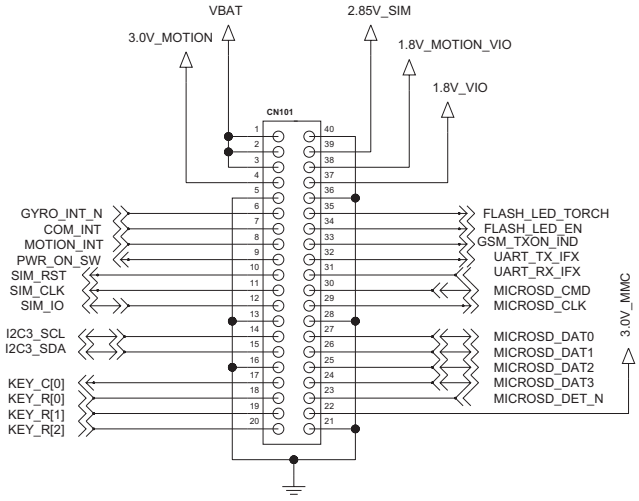


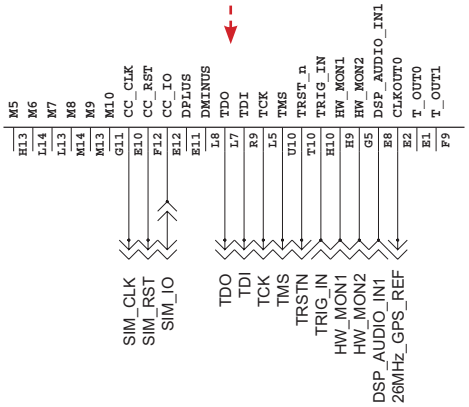


USIM For Infinieon

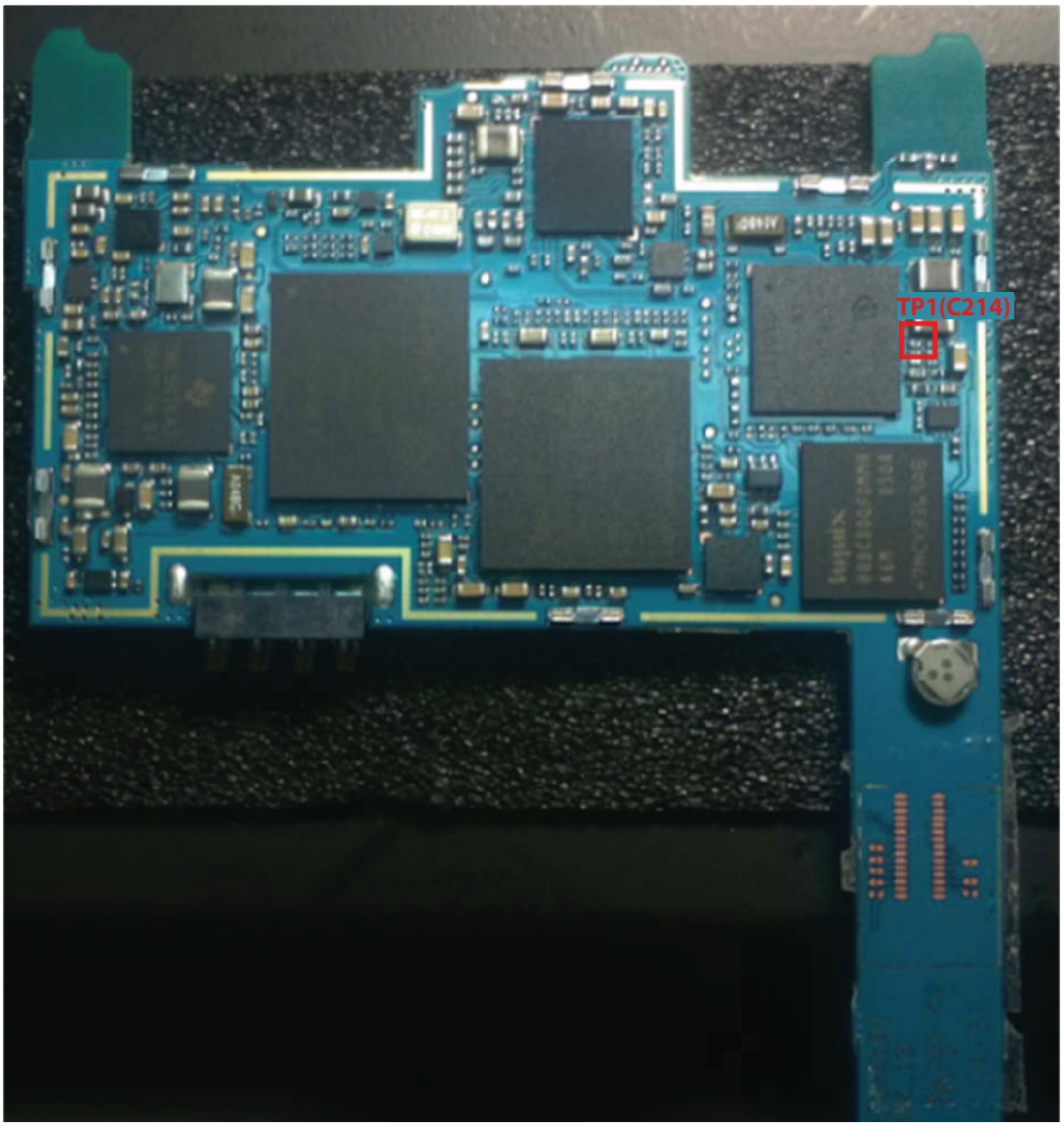


Main 2 Sub





C214 (2.85V_SIM)

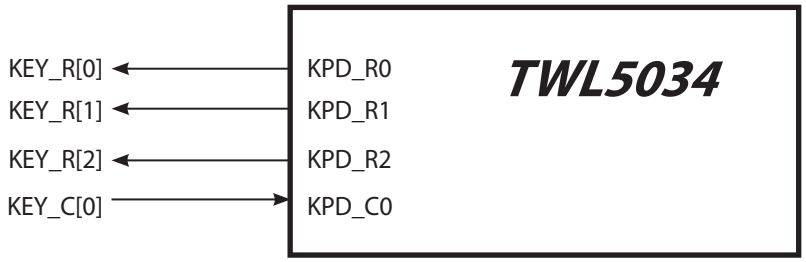


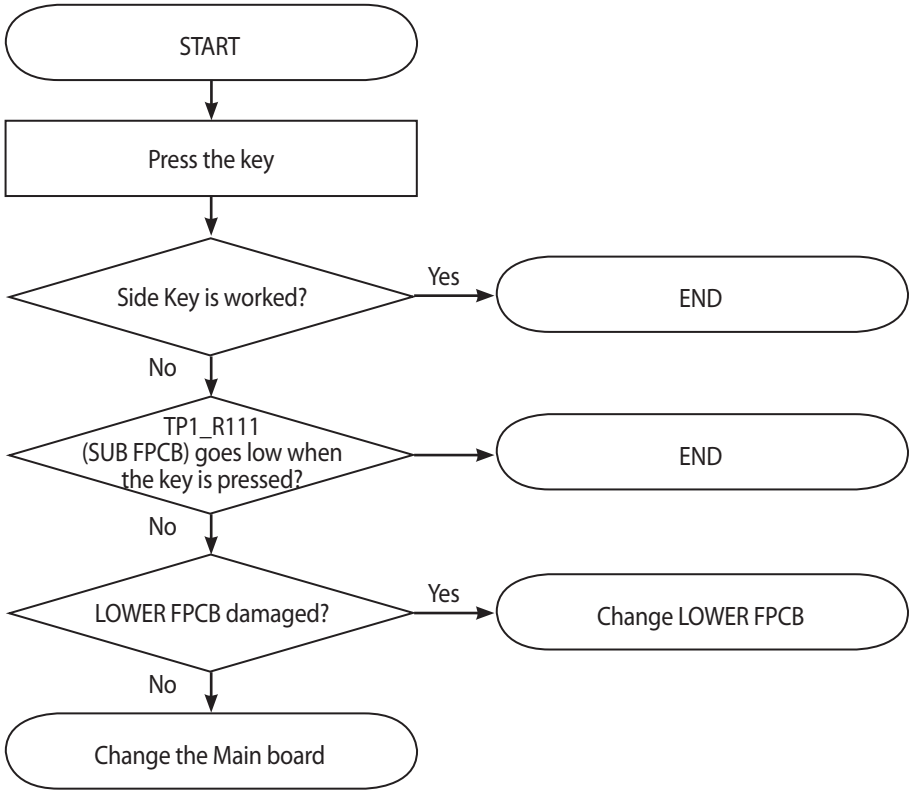
4.16 Side Key Trouble shooting

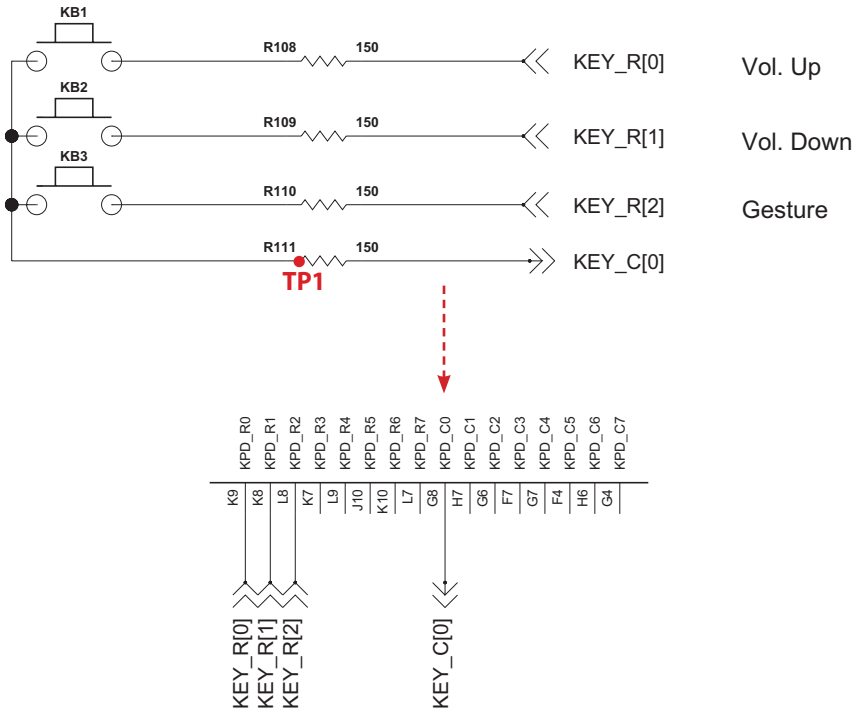
The sequence of detecting LGP970 Side key is,

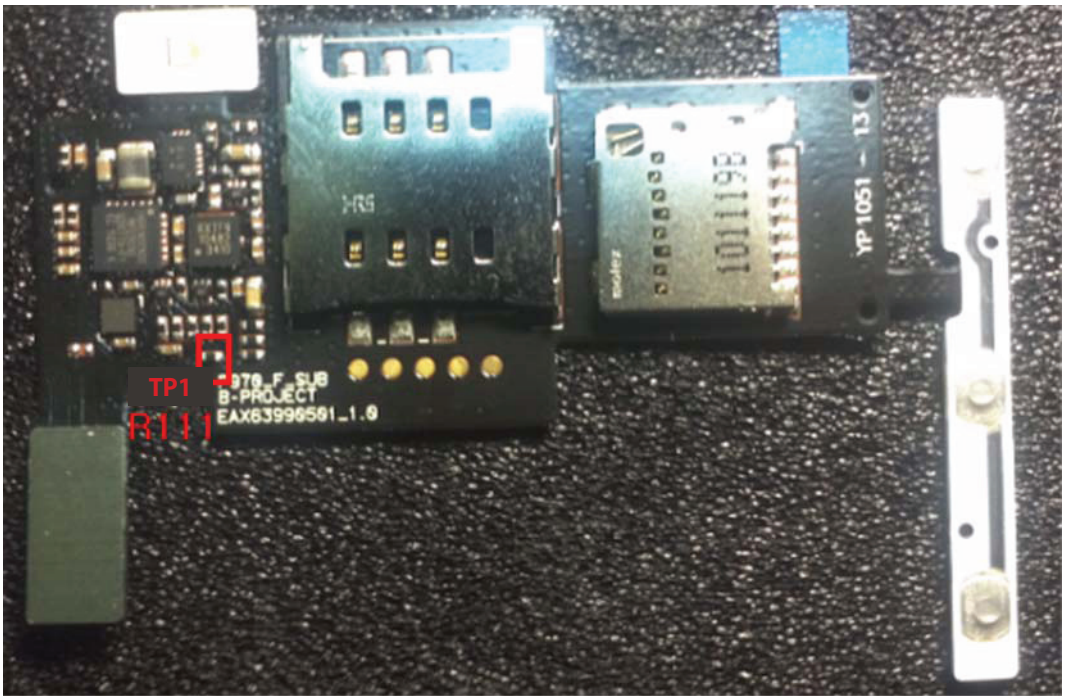
Side key pressed on LGP970 → KEY_R[0](Volume up), KEY_R[1](Volume_down), KEY_R[2](Gesture KEY) goes low

Block Diagram of Side key connection is shown below



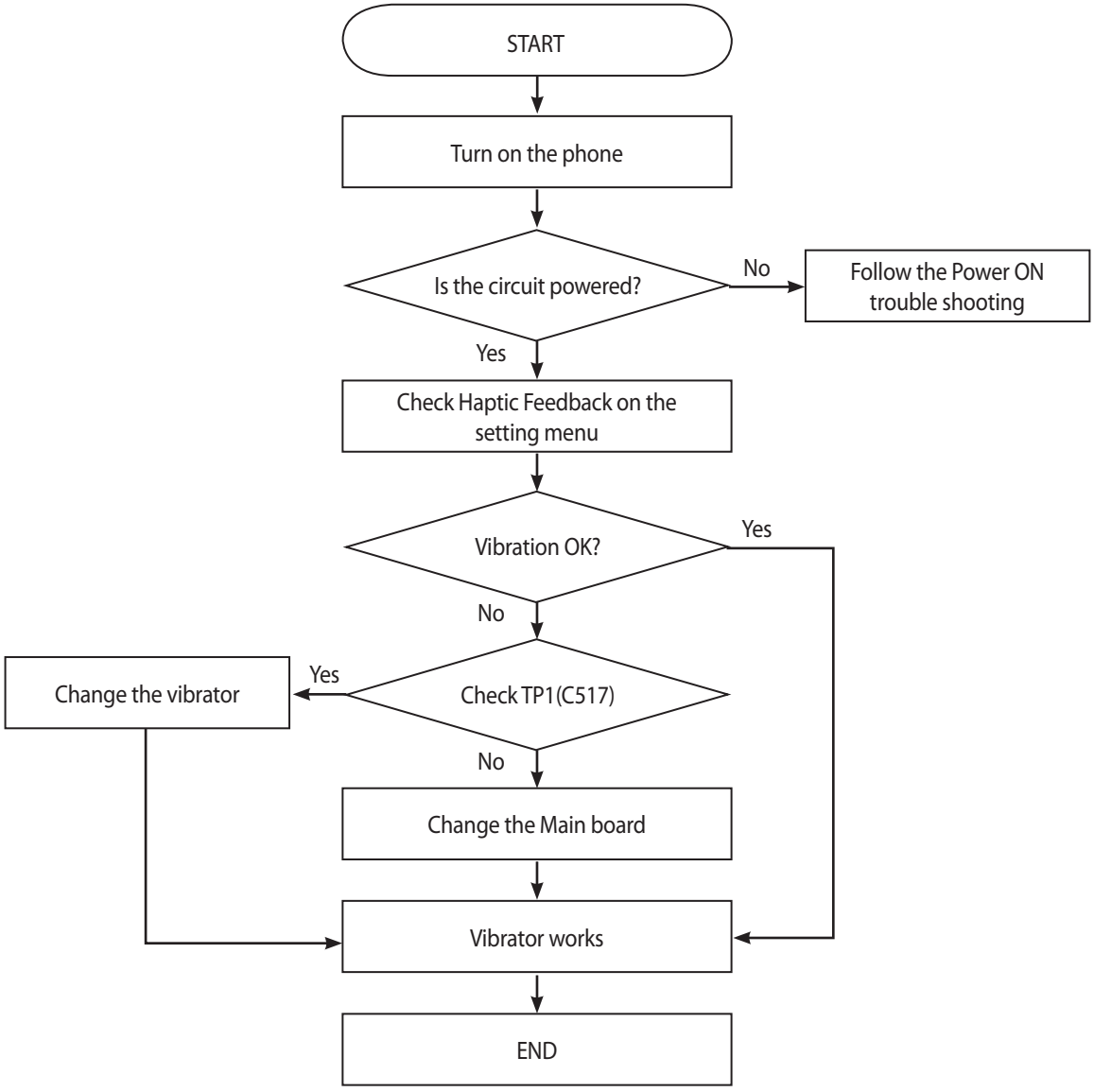


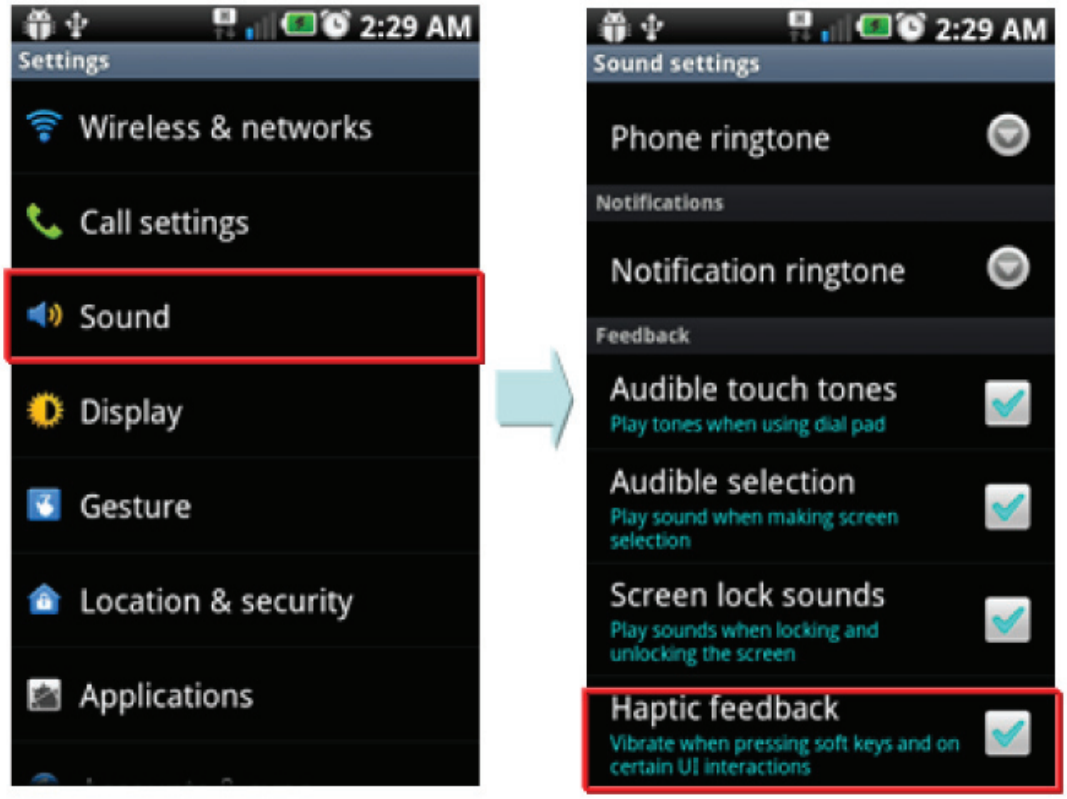


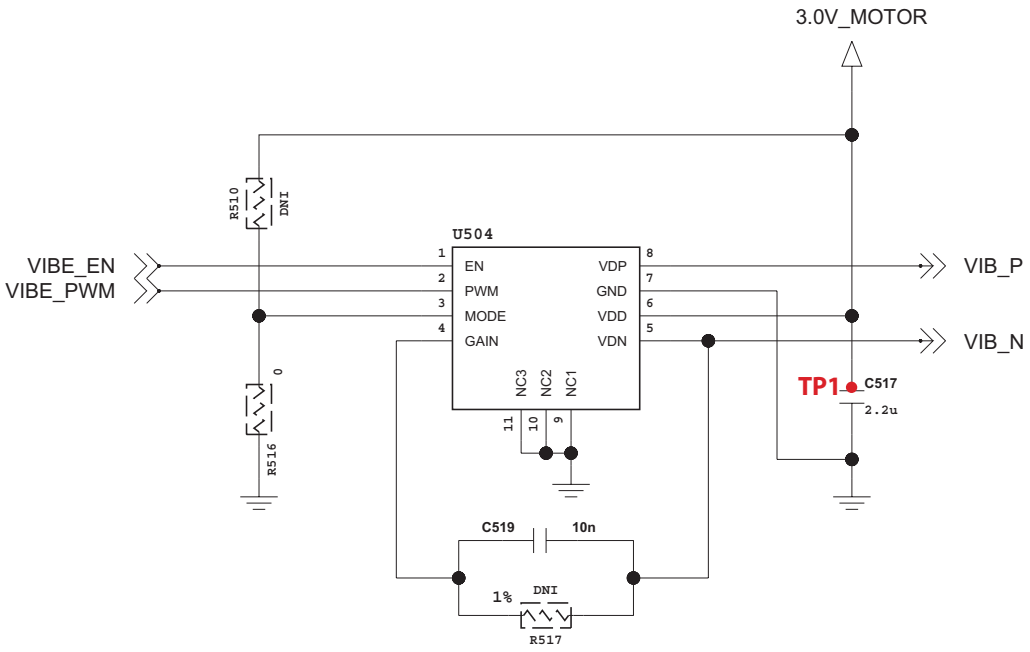


4.17 Vibrator Troubleshooting

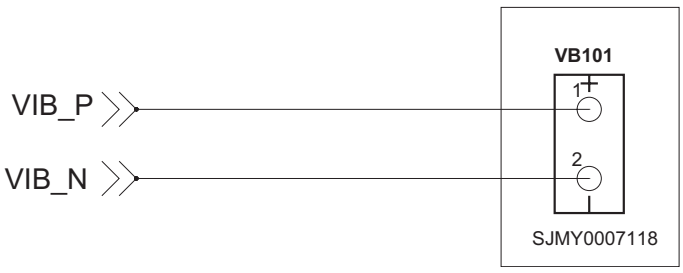
Check out the setting menu on the phone. If not, check Test points shown on the pictures.







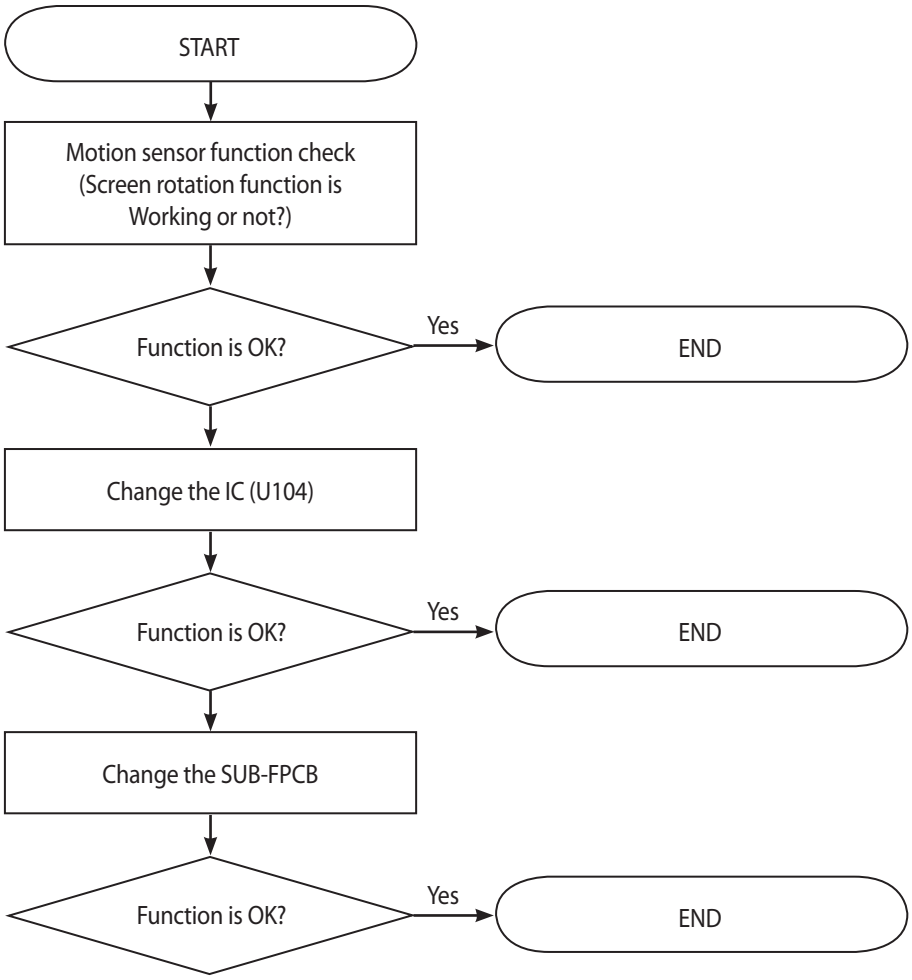
Q-Motor

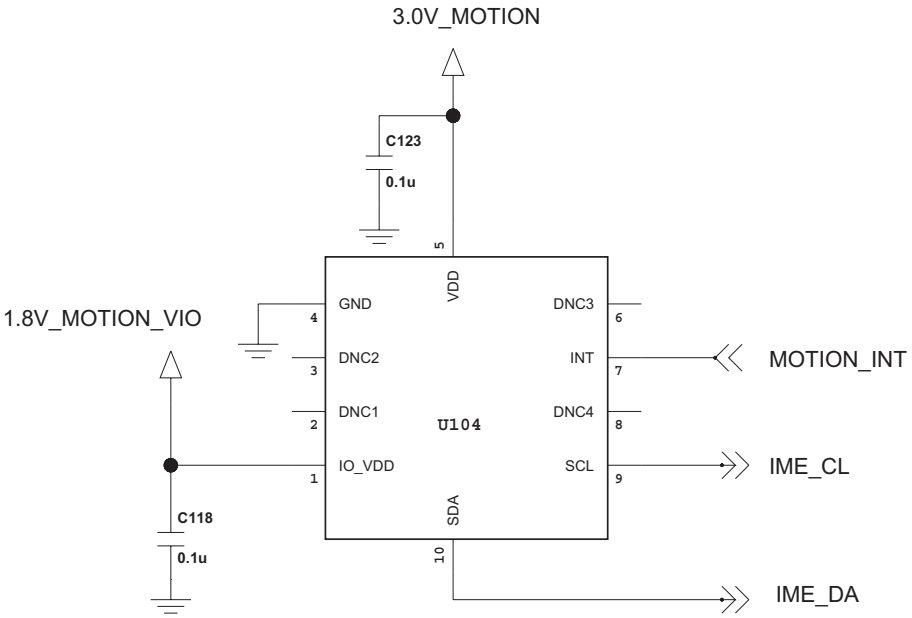


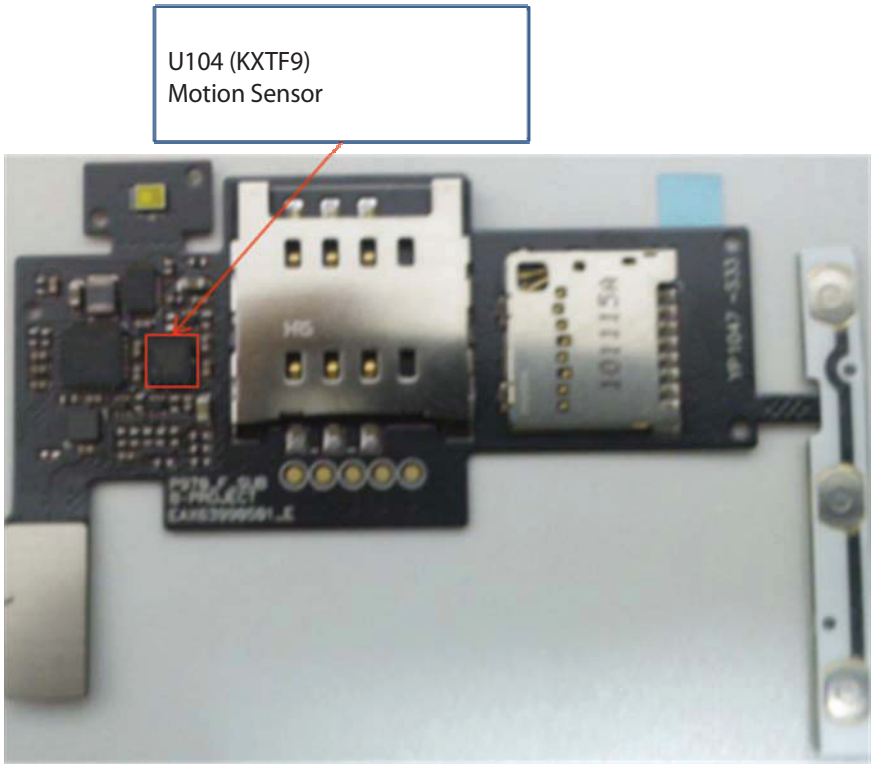
4.18 Motion sensor troubleshooting

When the motion sensor does not work, the reason is chip problem. If the motion sensor IC is damaged, it will do not work even thought power is supplied and OMAP3630 controls normally.

Therefore if the motion sensor is damaged, change the motion sensor IC or SUB-FPCB.



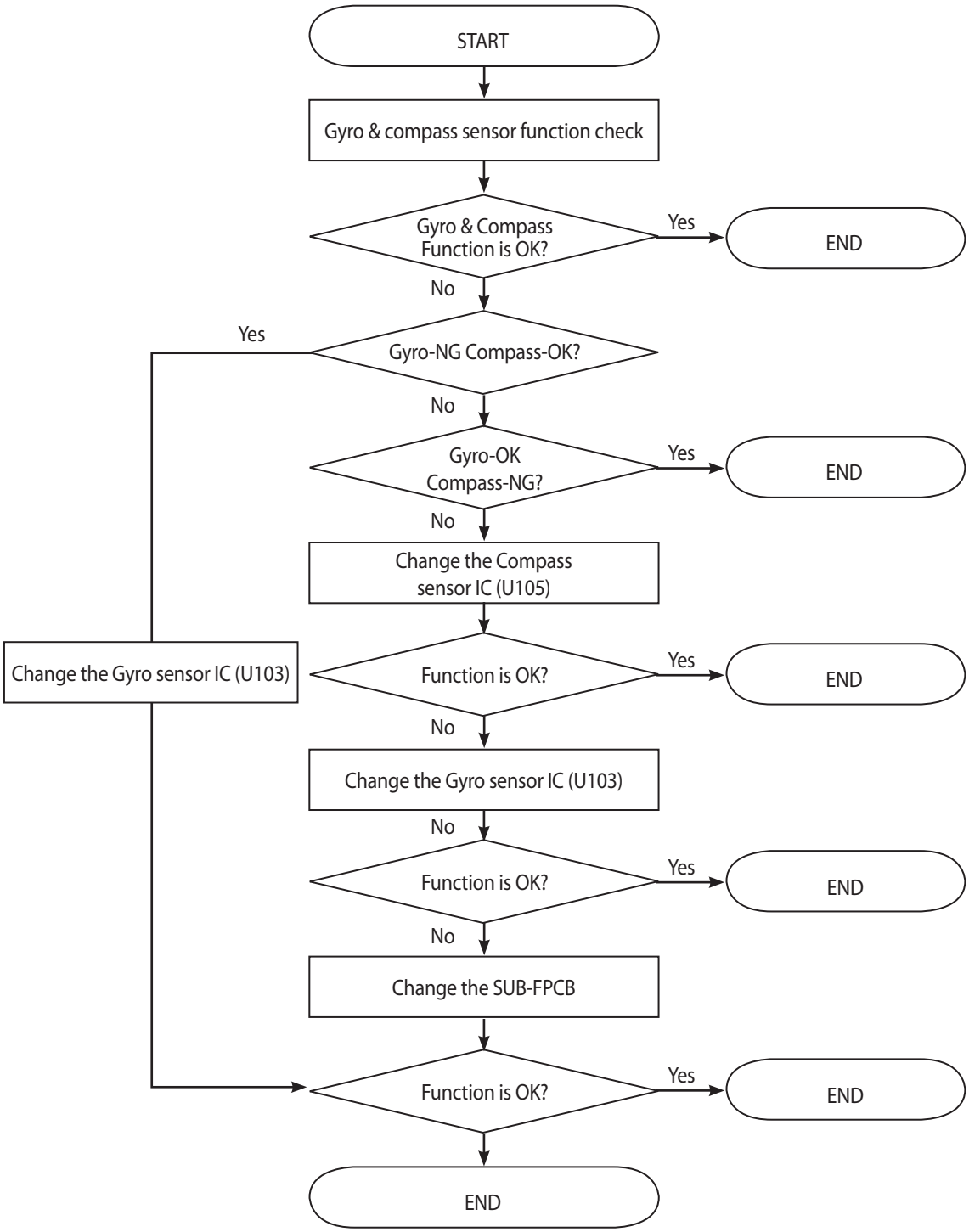


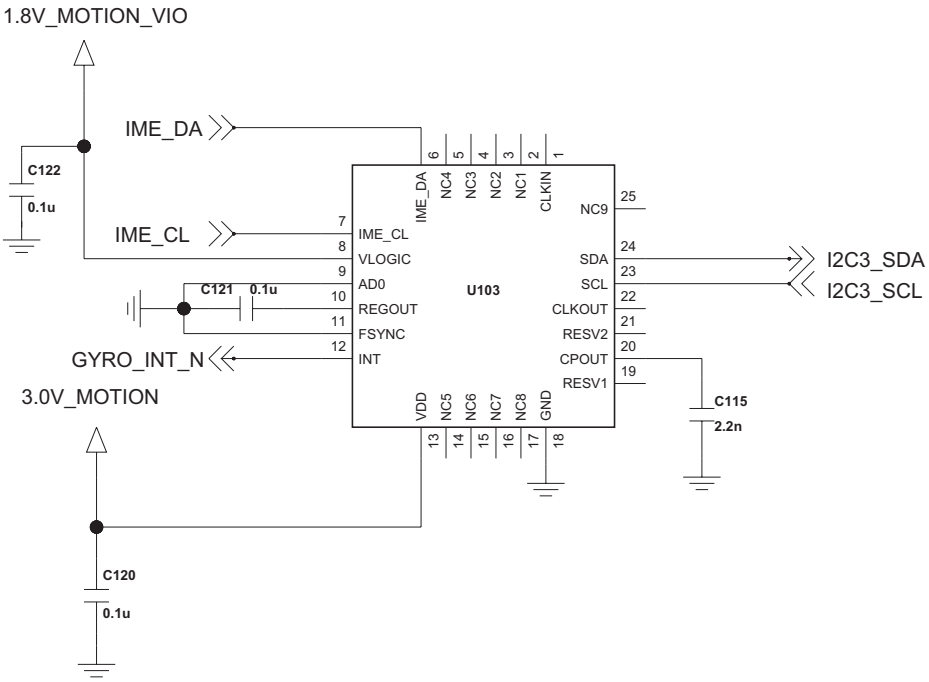


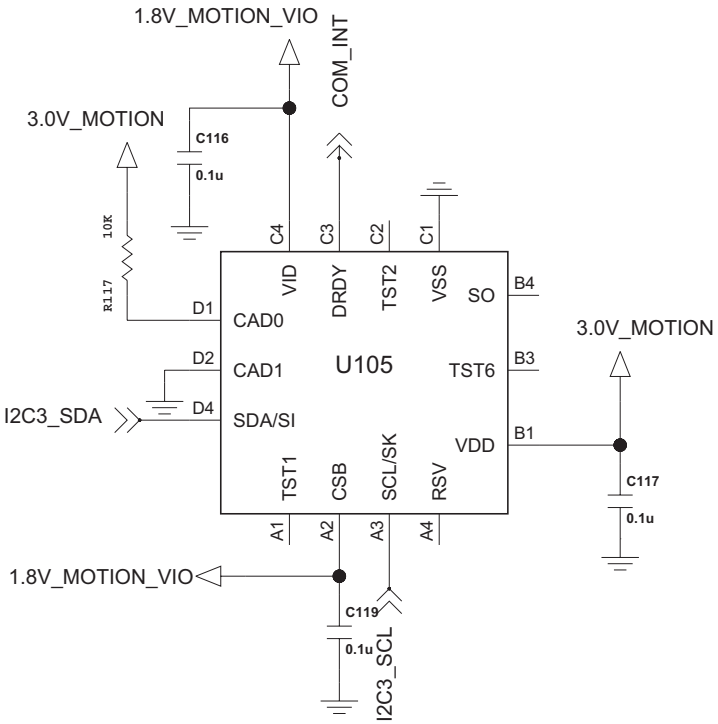
4.19 Gyro/Compass sensor troubleshooting

The compass sensor is calibrated by the gyro sensor data using SW algorithm.

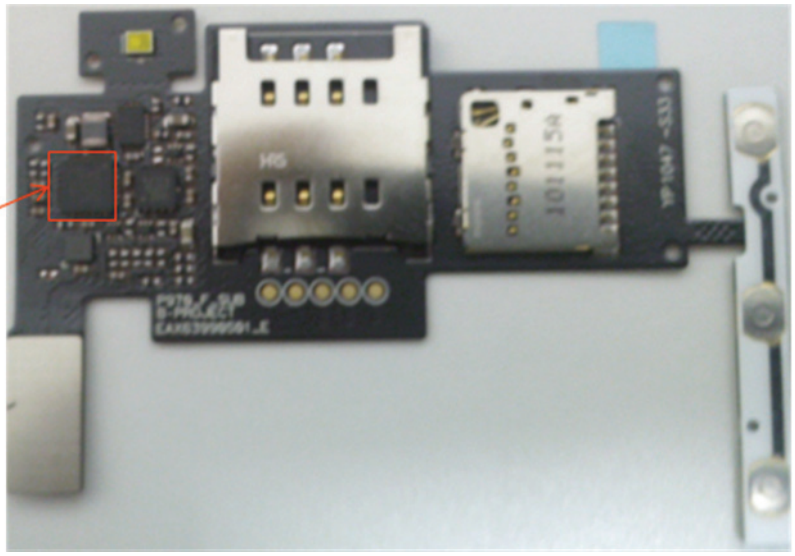
Therefore Gyro sensor error makes the compass sensor malfunction.



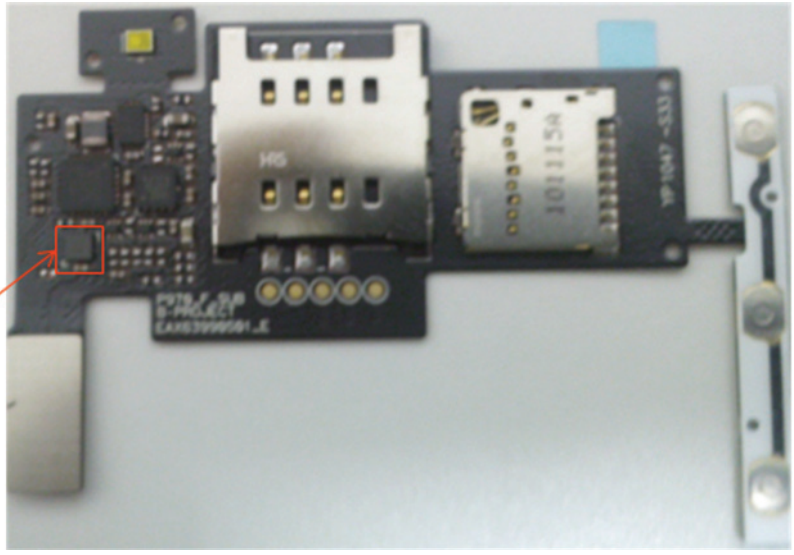




U103 (MPU3050)
GYRO Sensor



U105 (AK8975C)
Compass Sensor

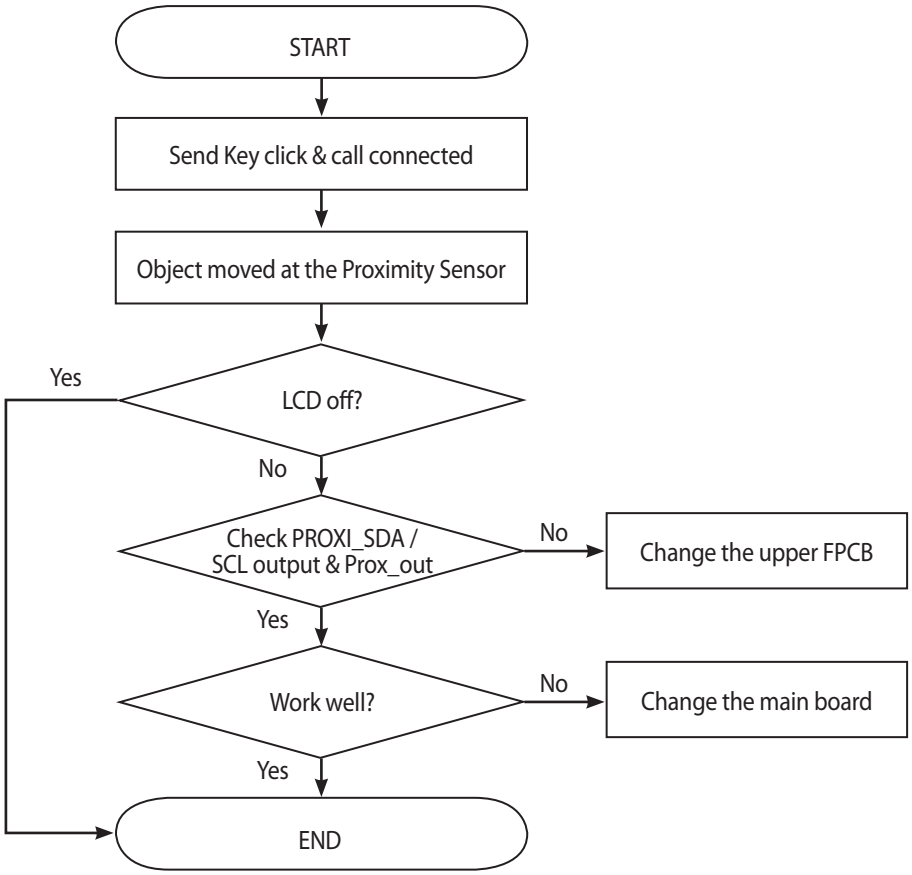


4.20 Proximity Sensor on/off trouble

Proximity Sensor is worked as below:

Send Key click ➔ Phone number click ➔ Call connected ➔ Object moved at the sensor

➔ Control the screen's on/off operation automatically



Measurement

PROXI_VCC

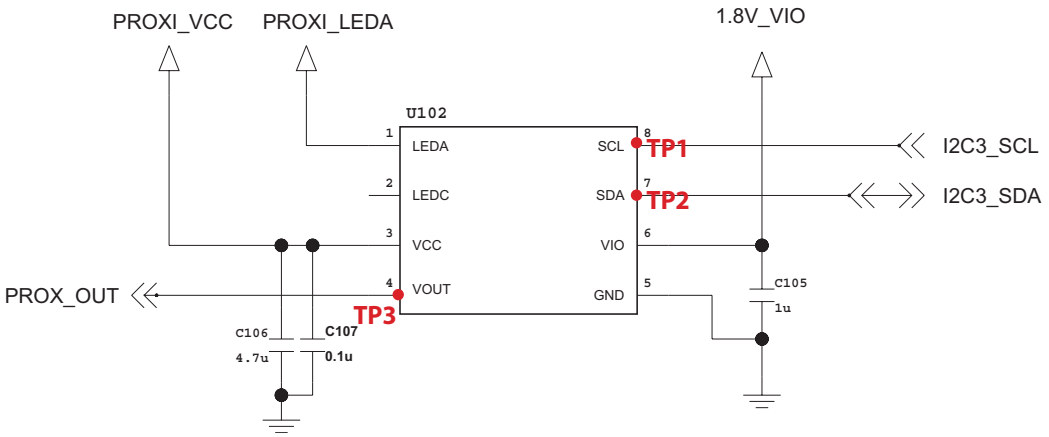
1.8V_VIO

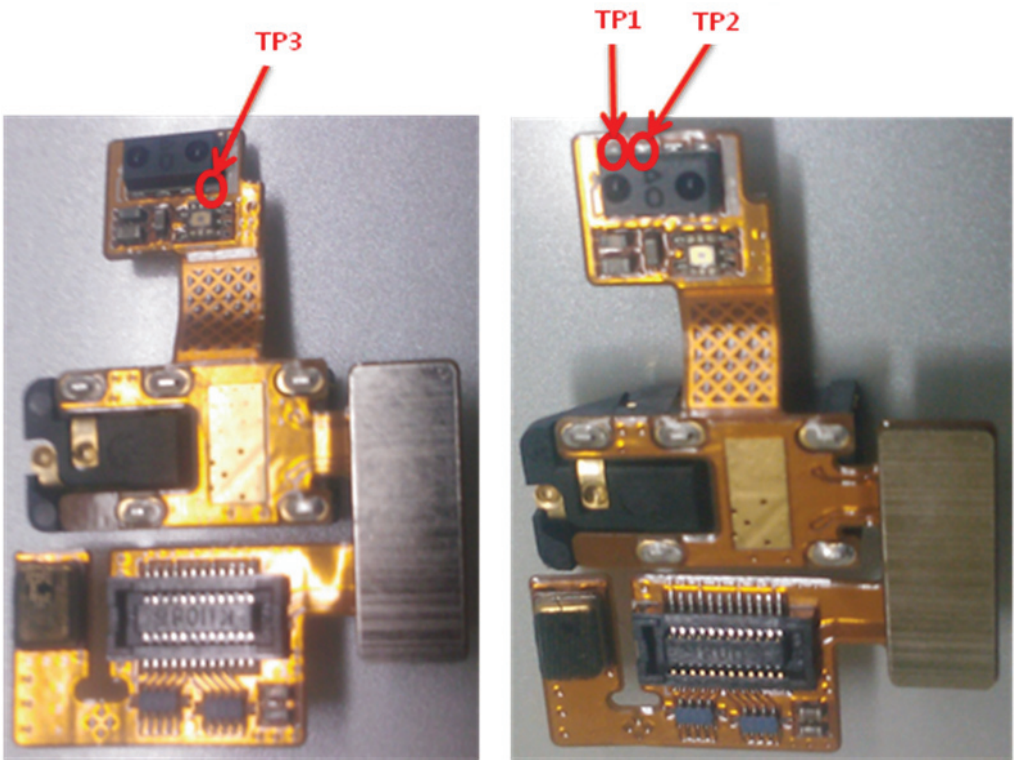
PROXI_LEDA

PROX_OUT (TP3)

I2C3_SCL (TP1)

I2C3_SDA (TP2)

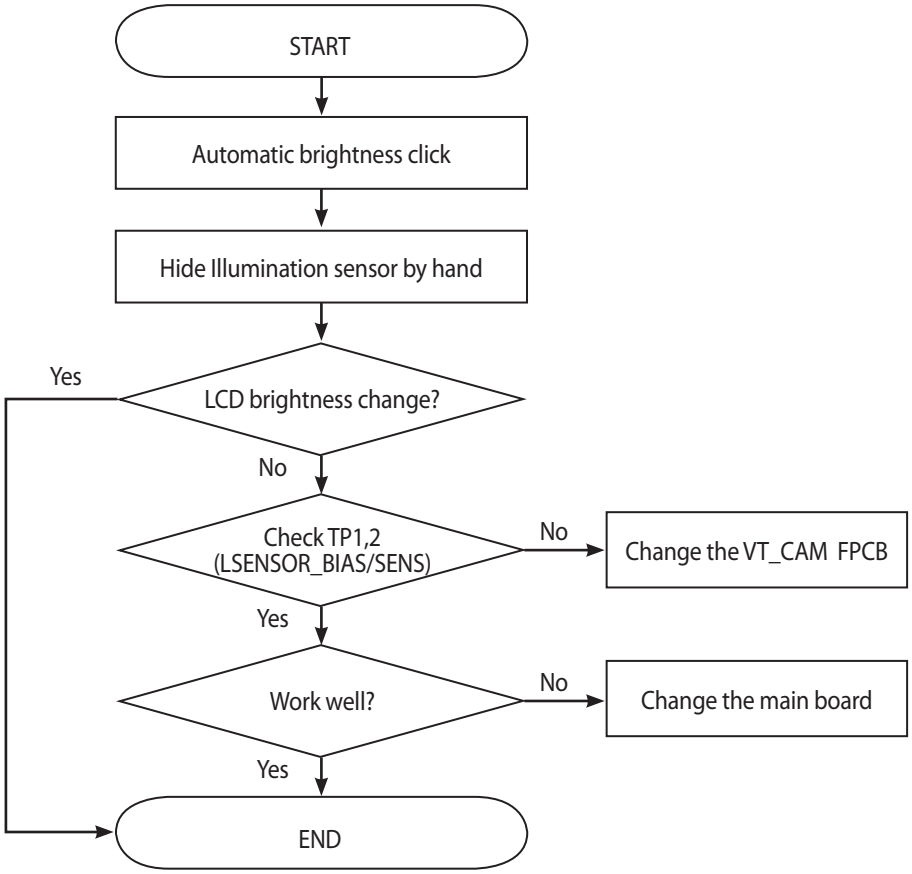




4.21 Illumination Sensor on/off trouble

Illumination Sensor is worked as below:

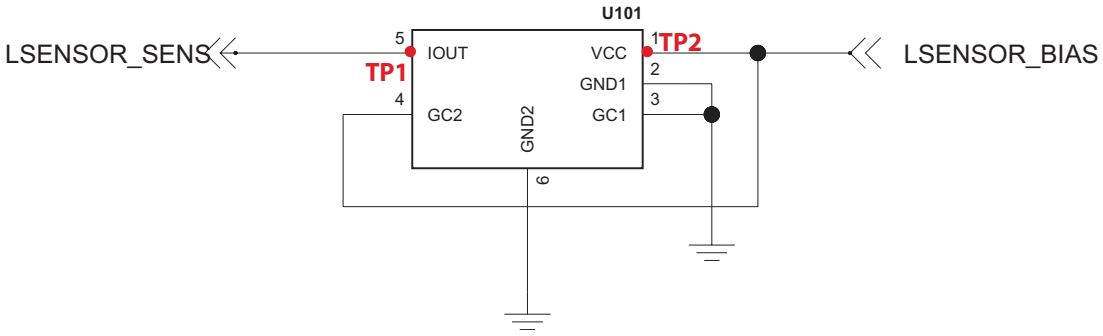
Menu Key click ➔ Settings click ➔ Display click ➔ Brightness click ➔ Automatic brightness click

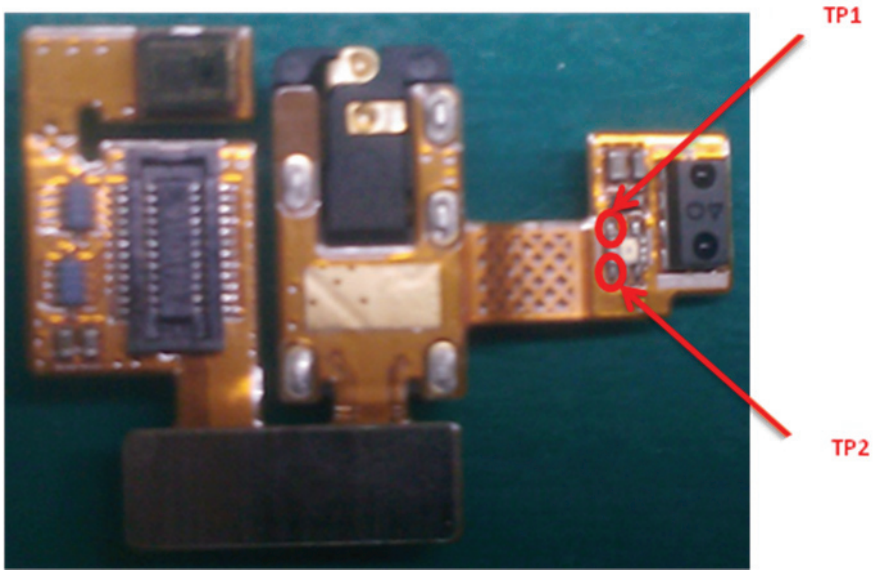


Measurement

LSENSOR_BIAS (TP2)

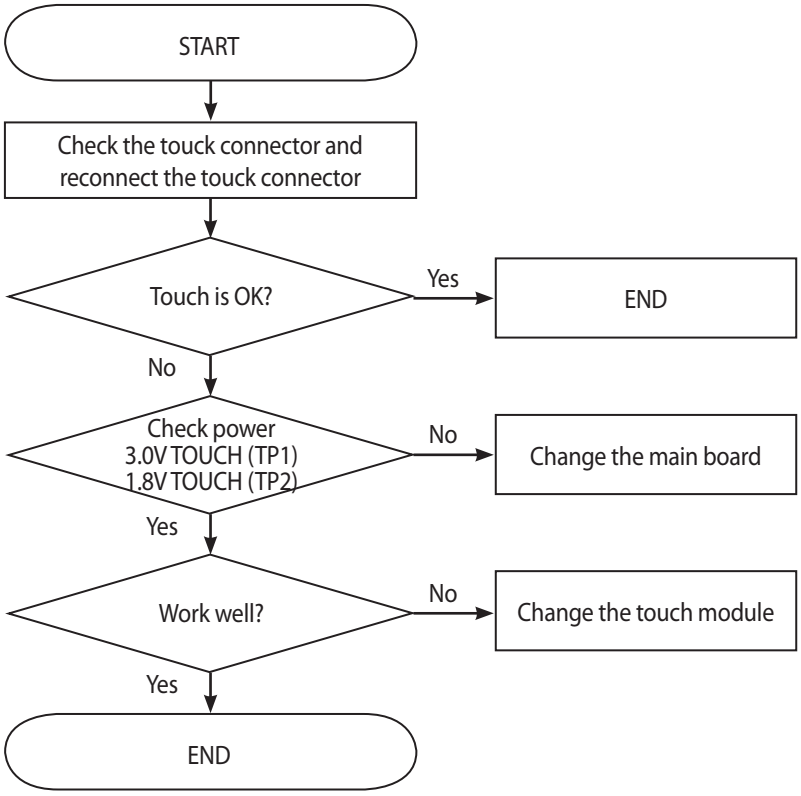
LSENSOR_SENS (TP1)





4.22 Touch trouble

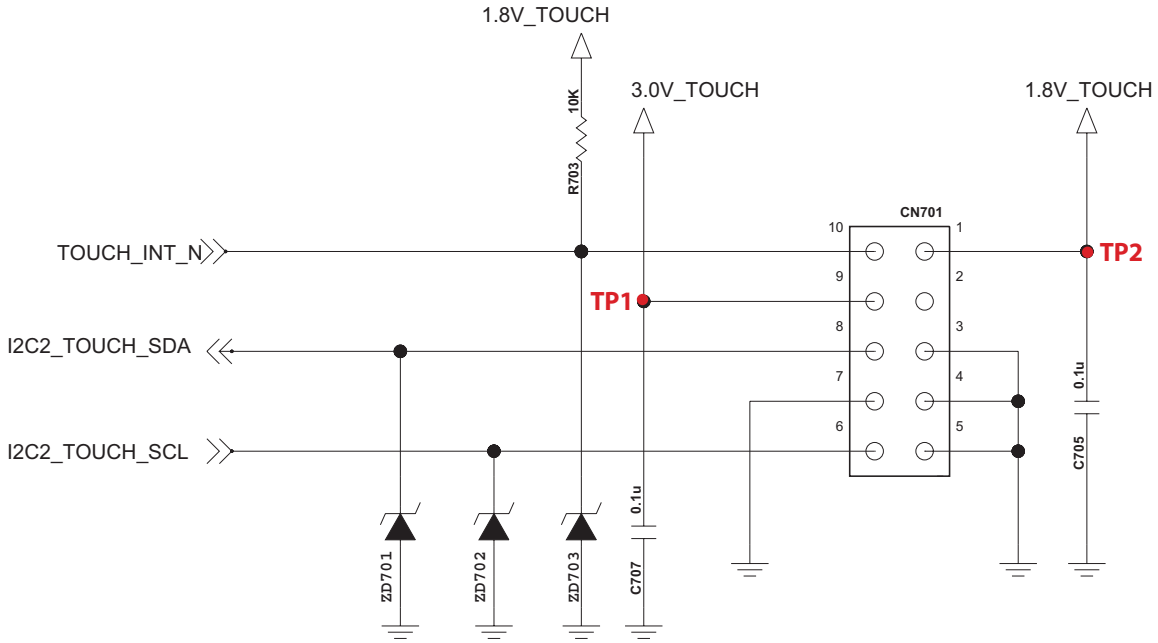
Touch control signals are generated by AP20. Those signal's path are : AP20 -> Touch Module

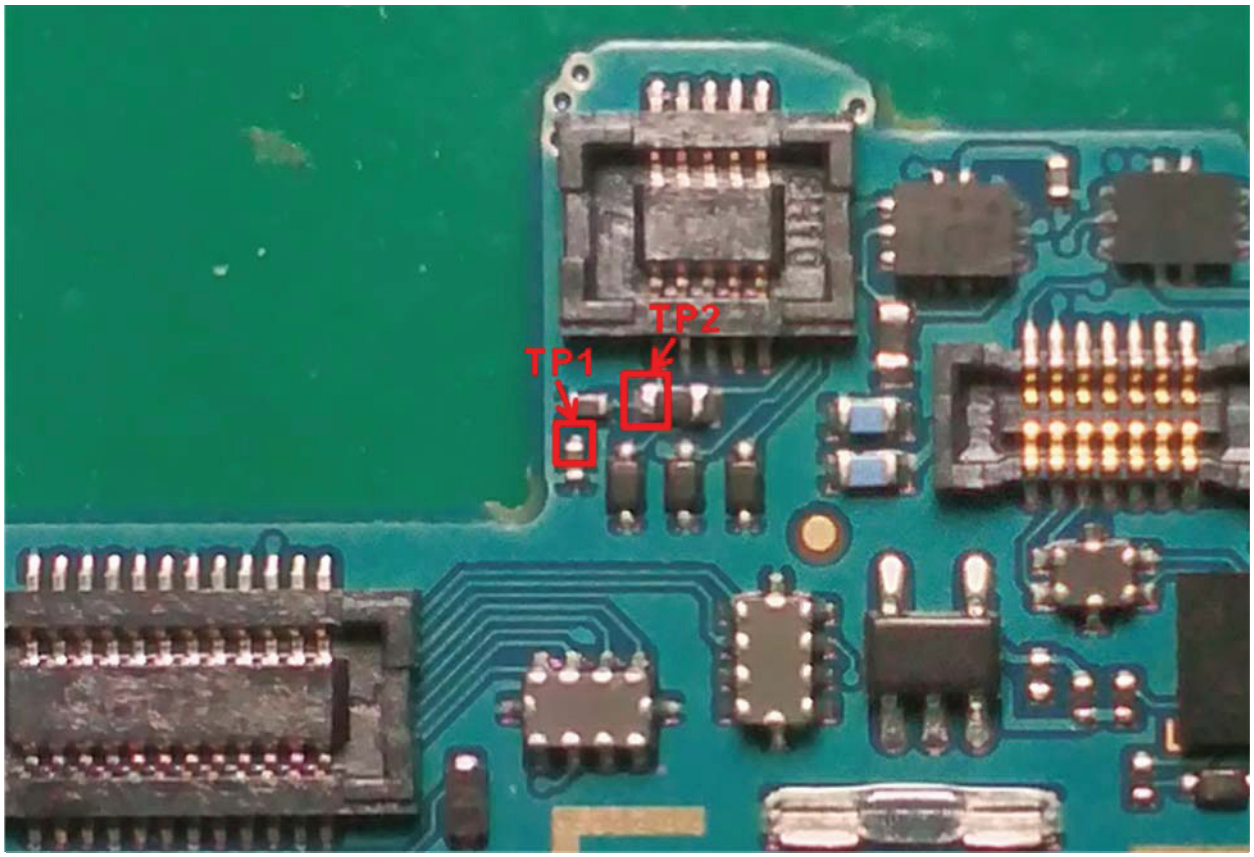


Measurement

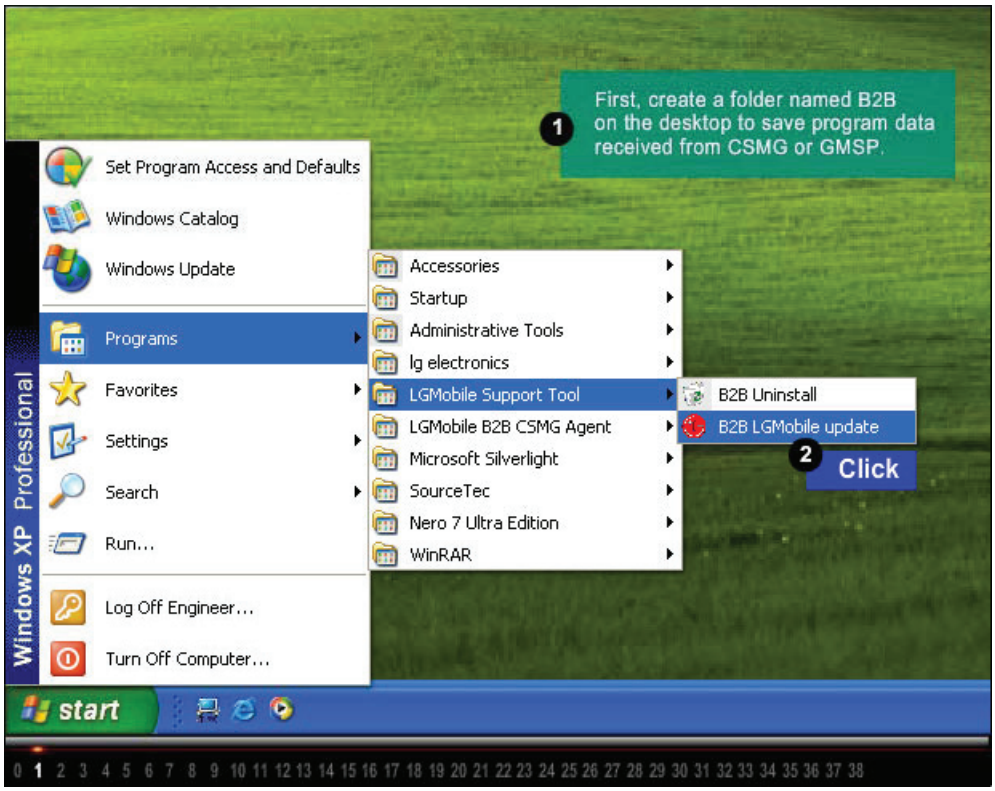
3.0V TOUCH (TP1)

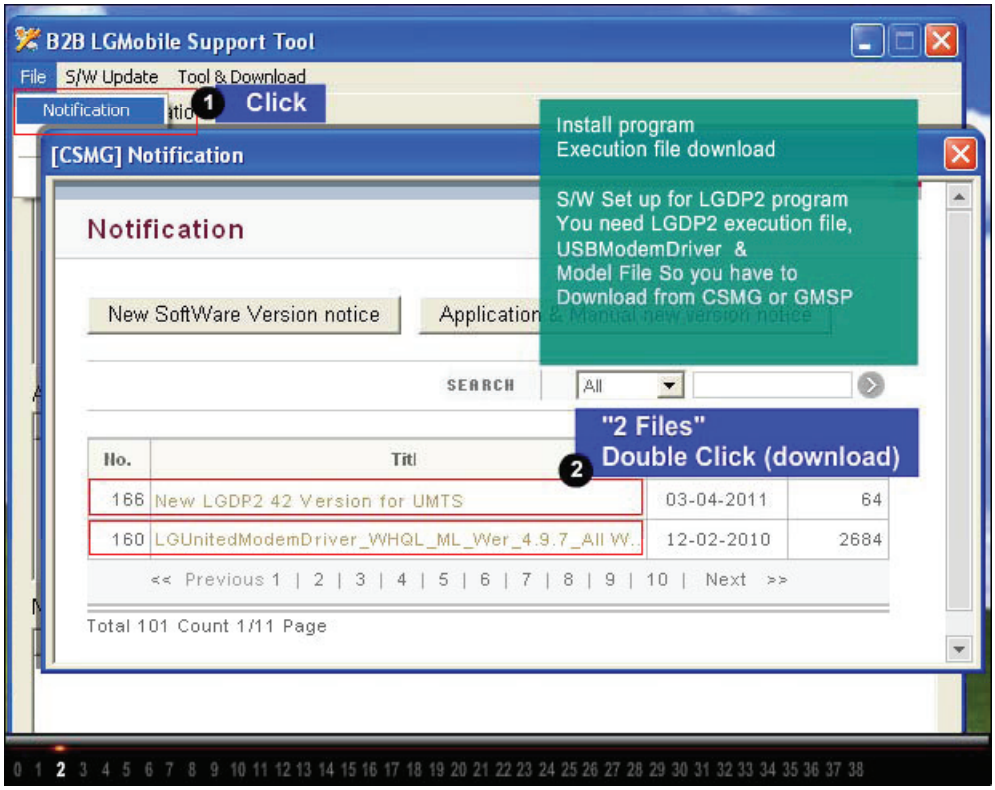
1.8V TOUCH (TP2)

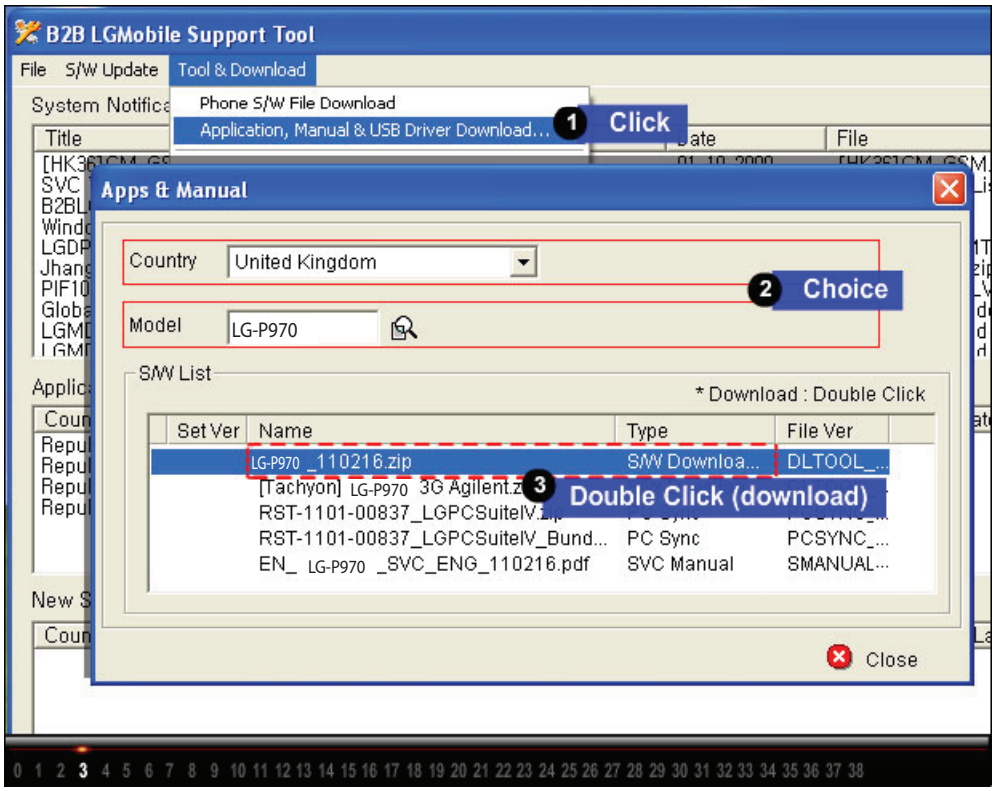


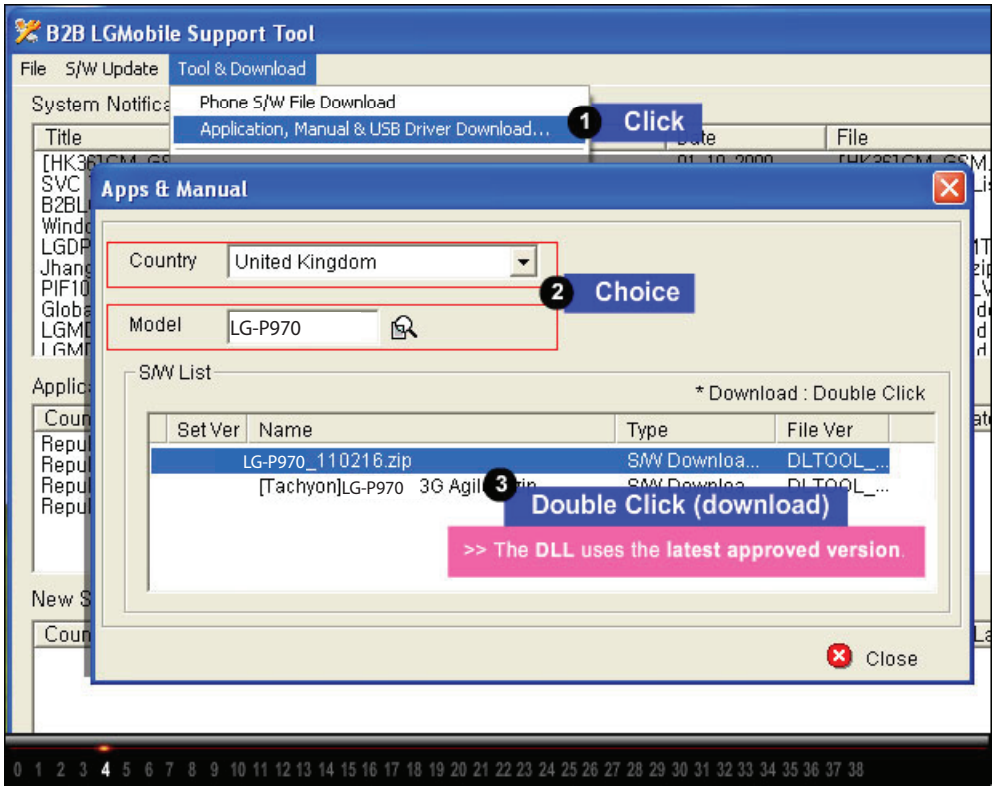


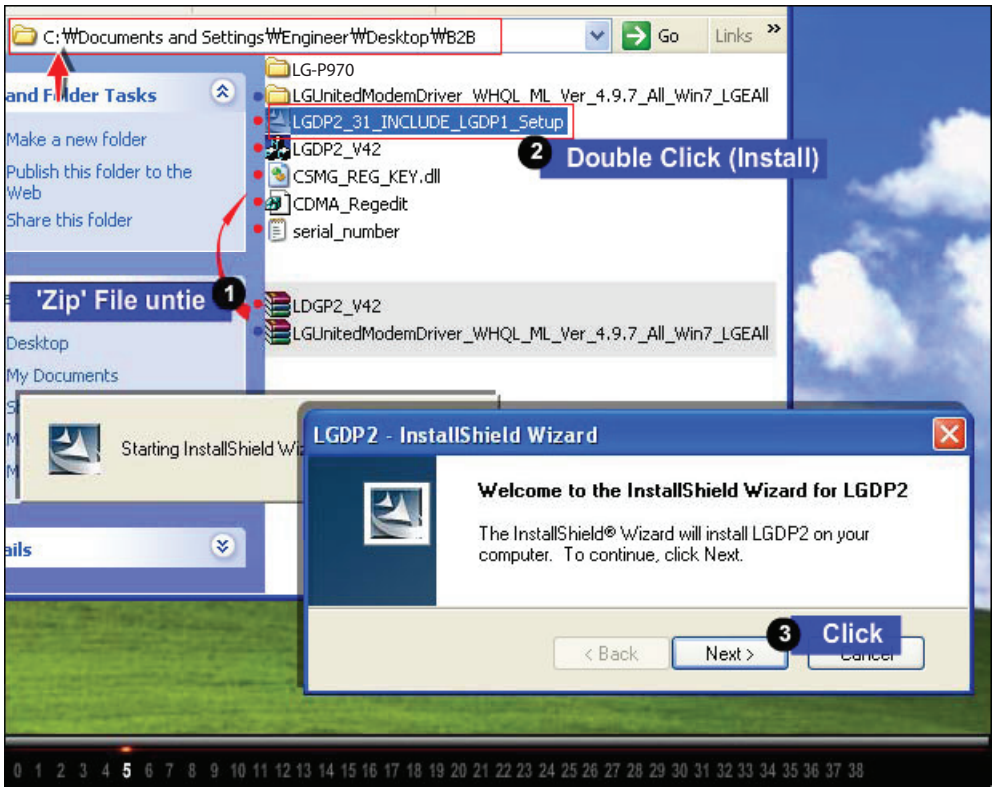
5. DOWNLOAD

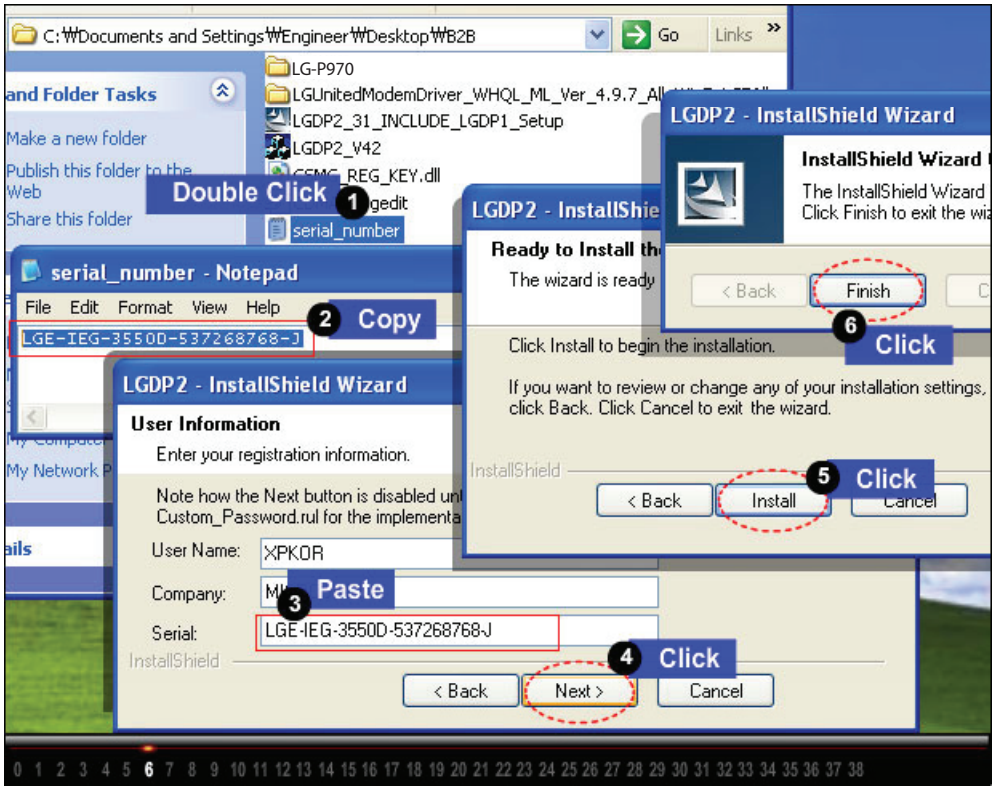


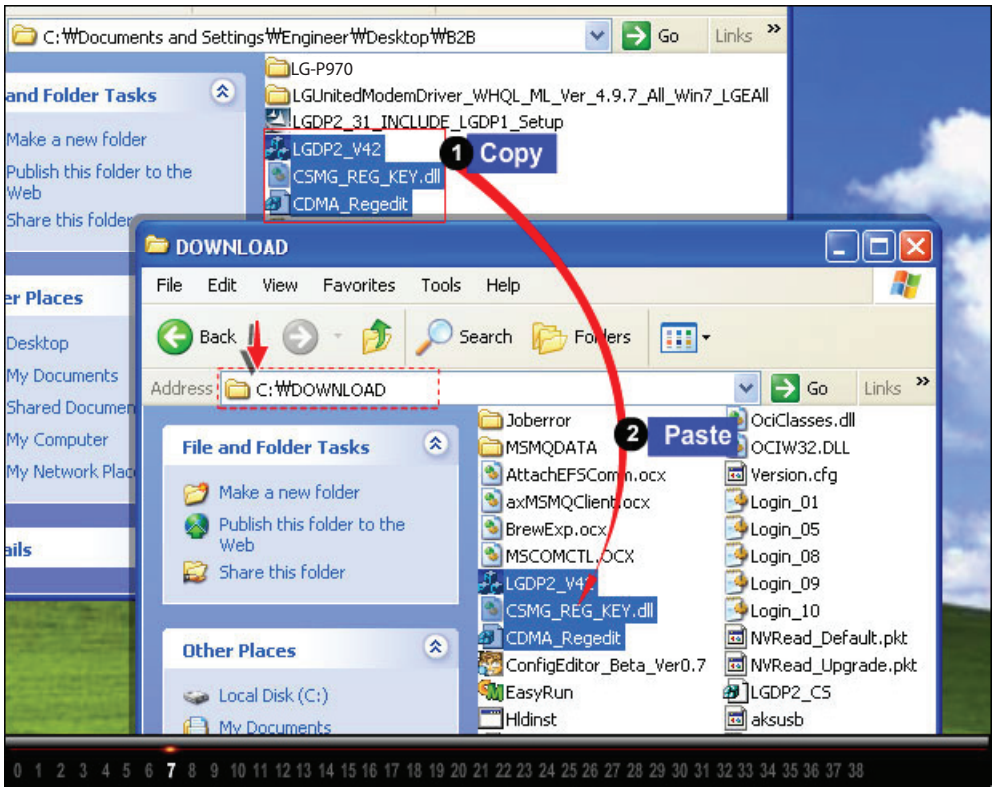


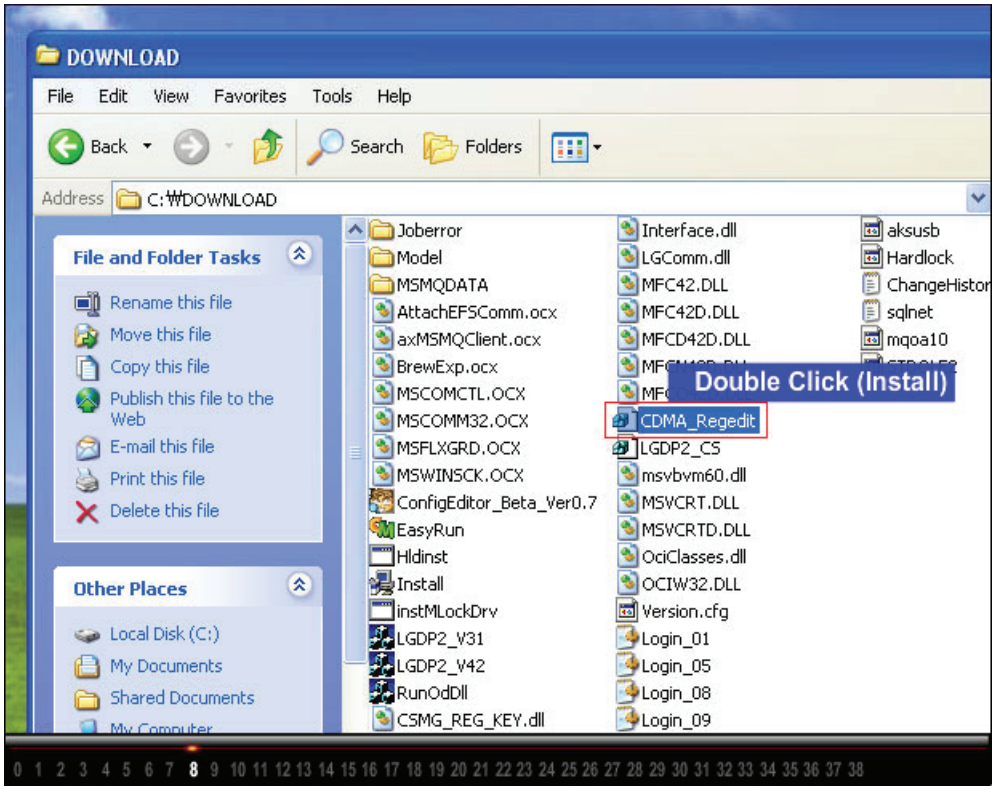


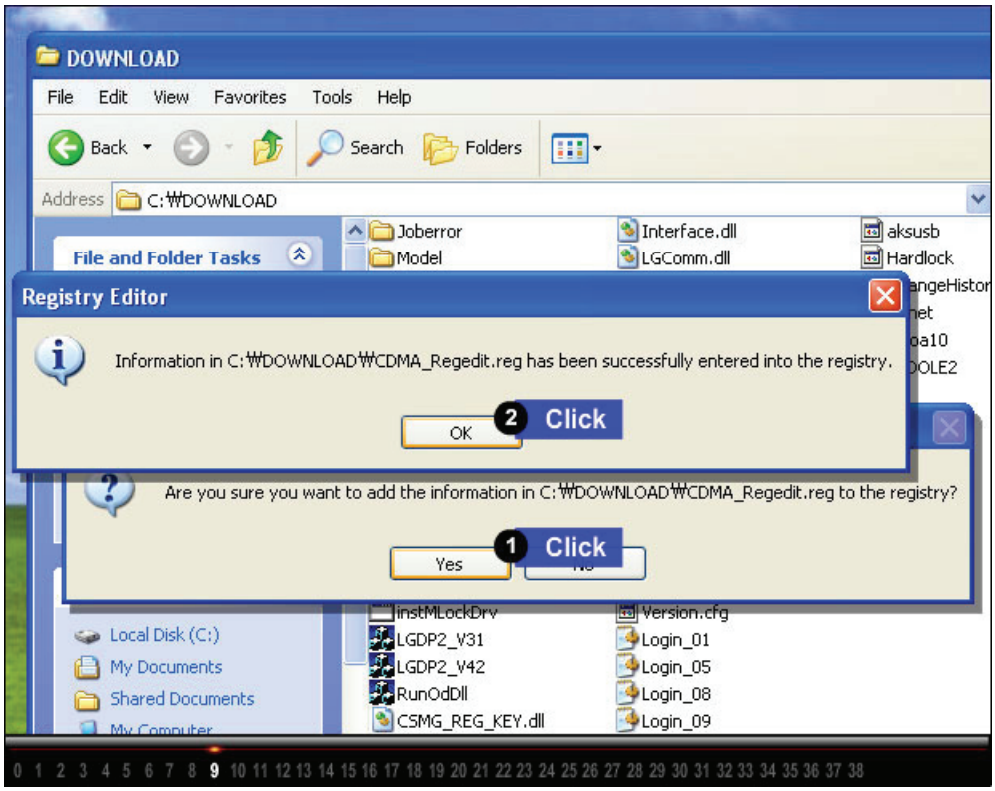


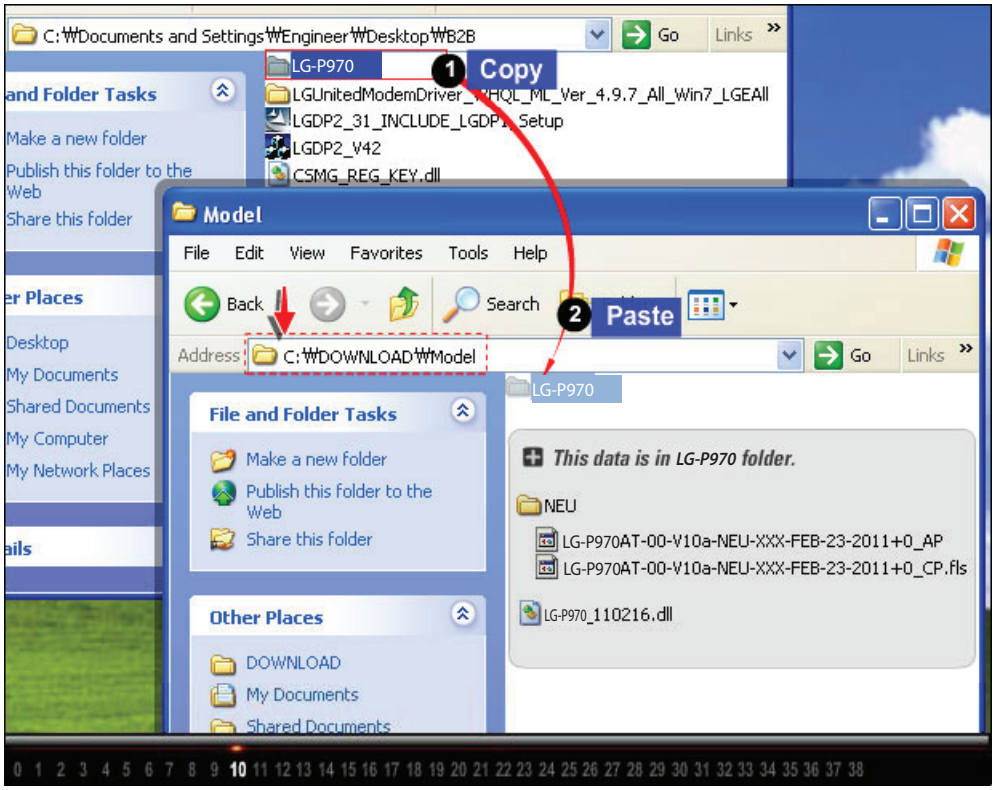


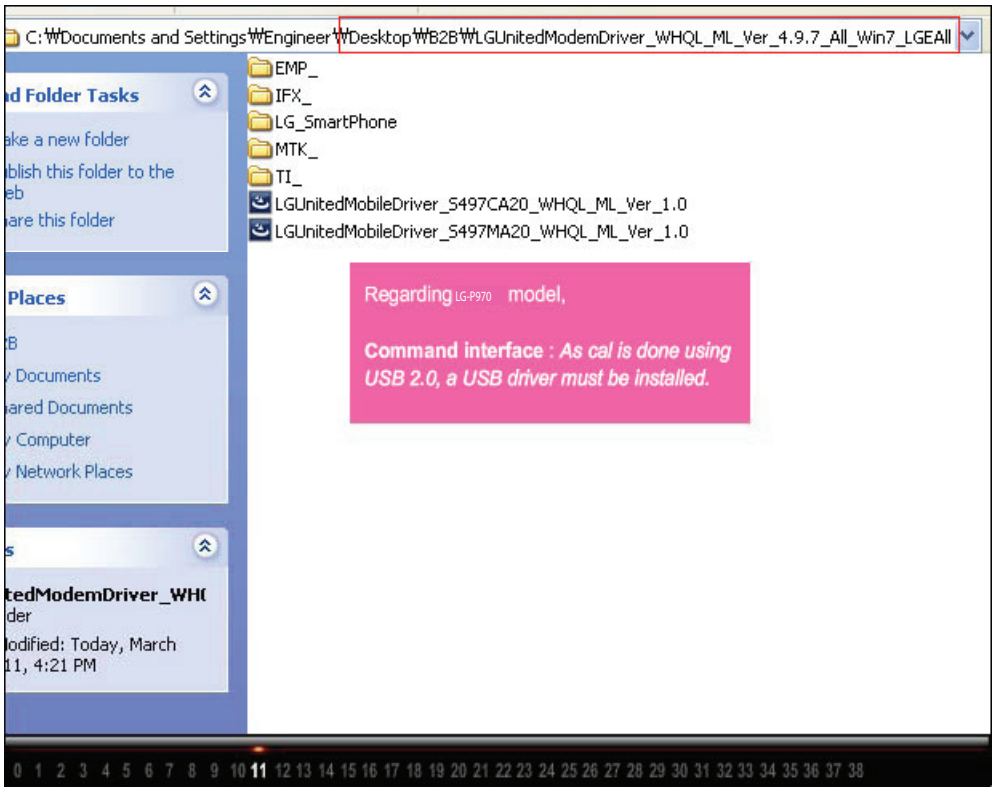


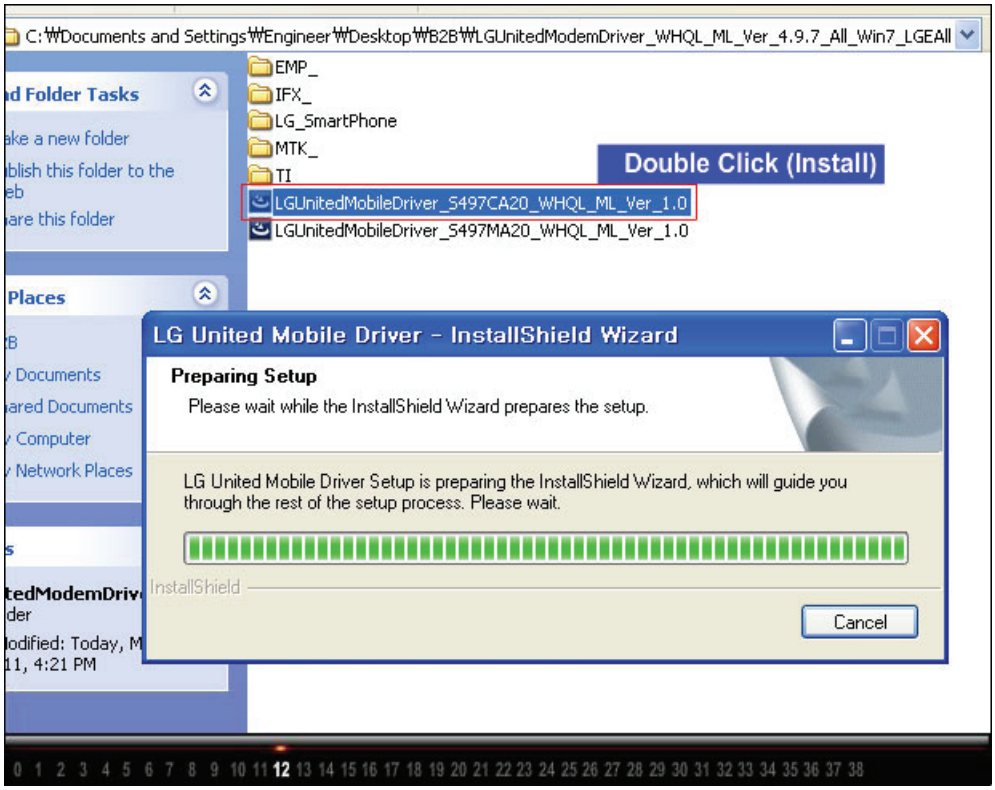


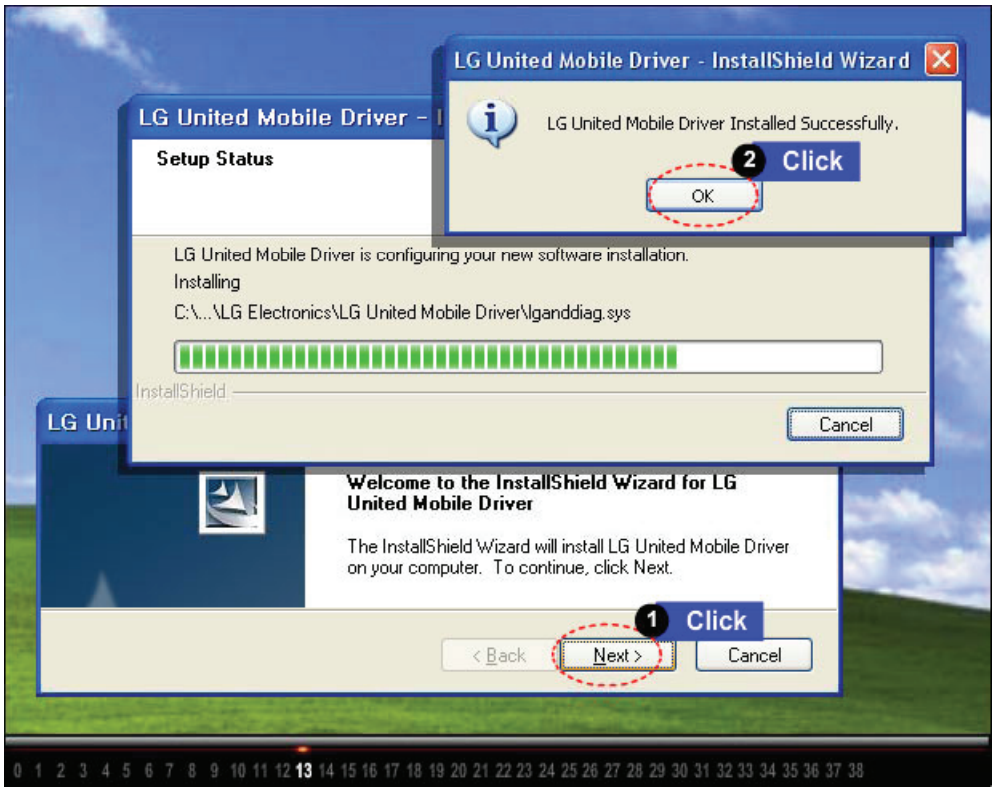


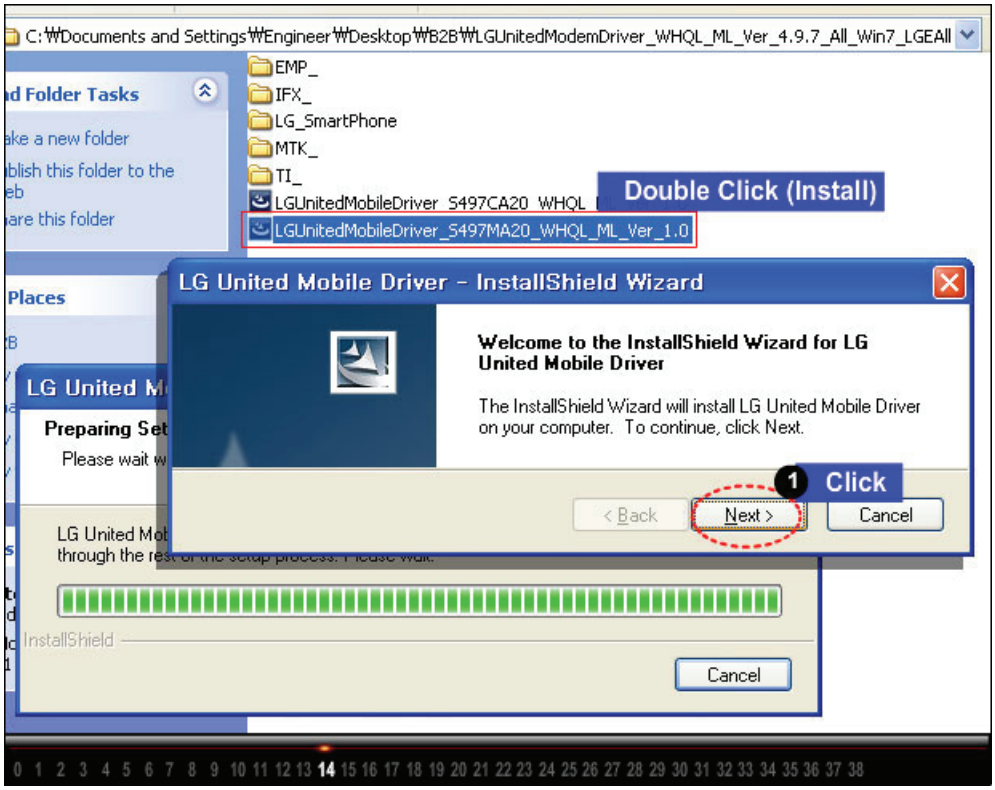


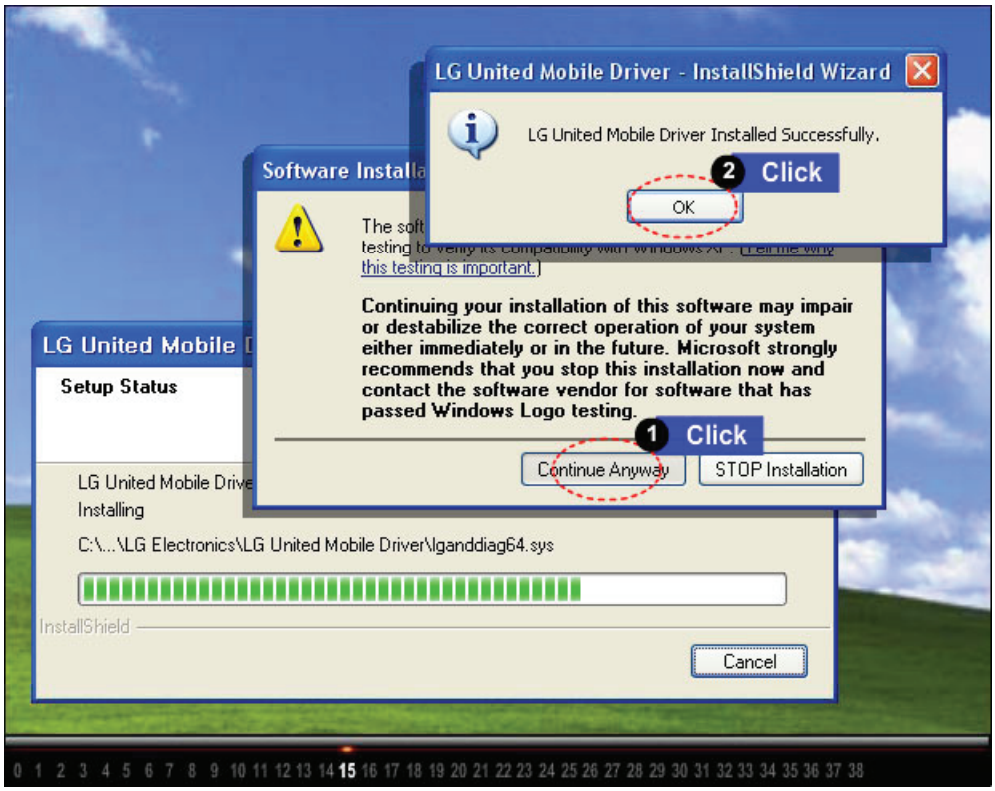


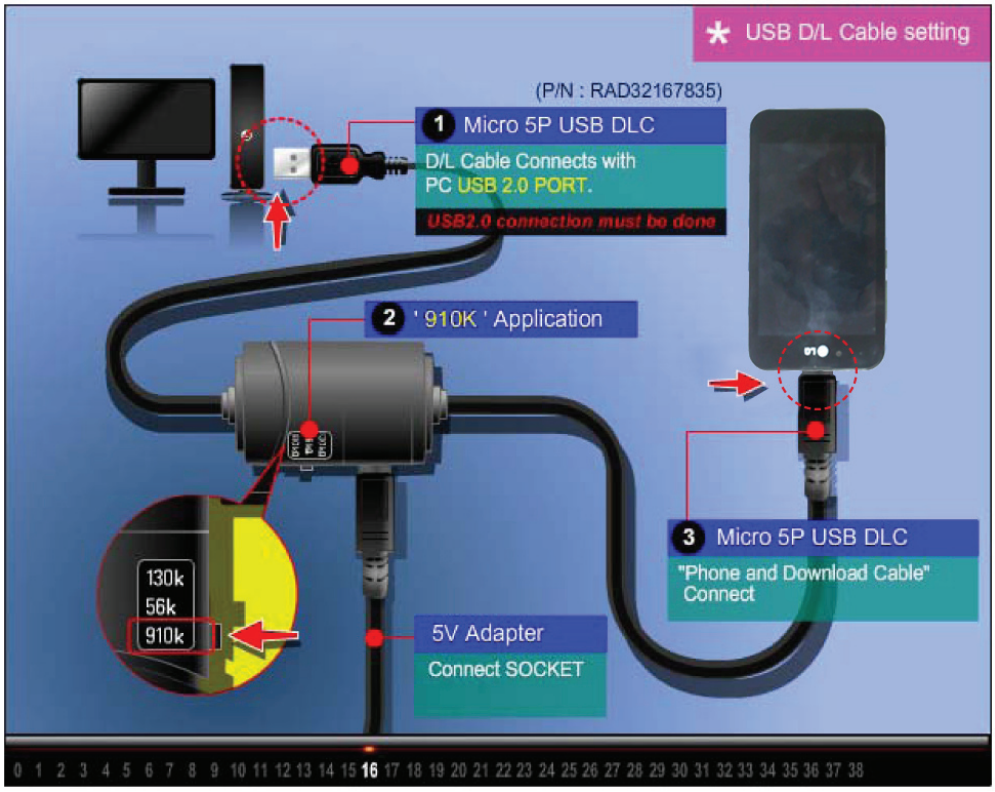


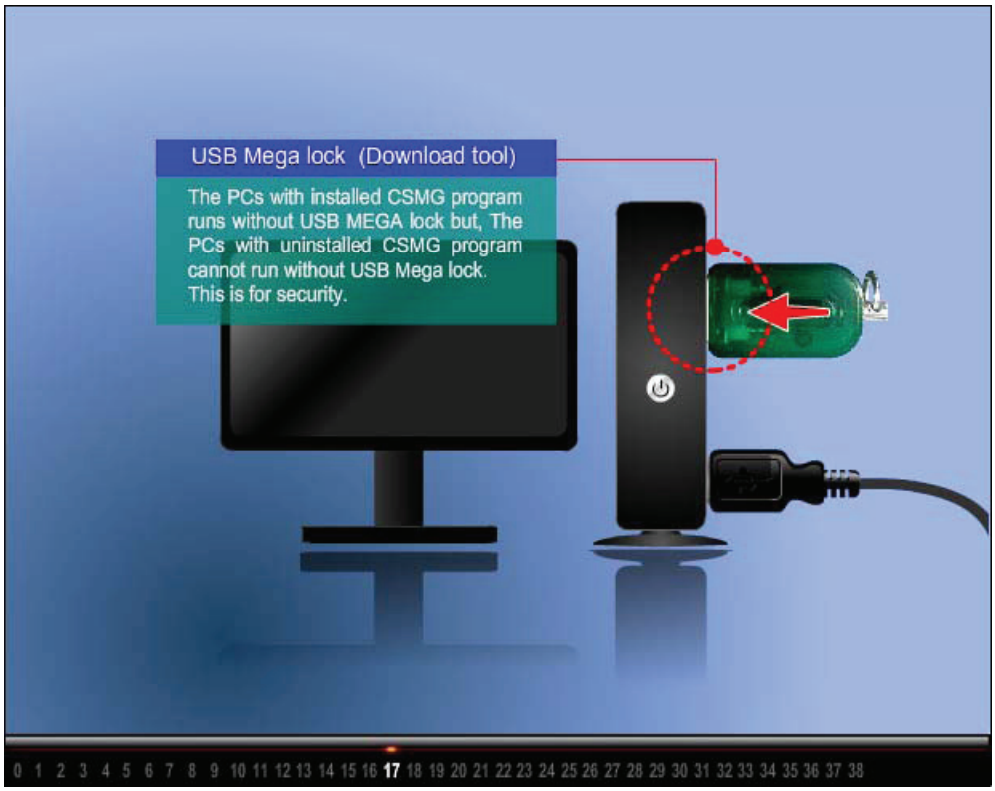


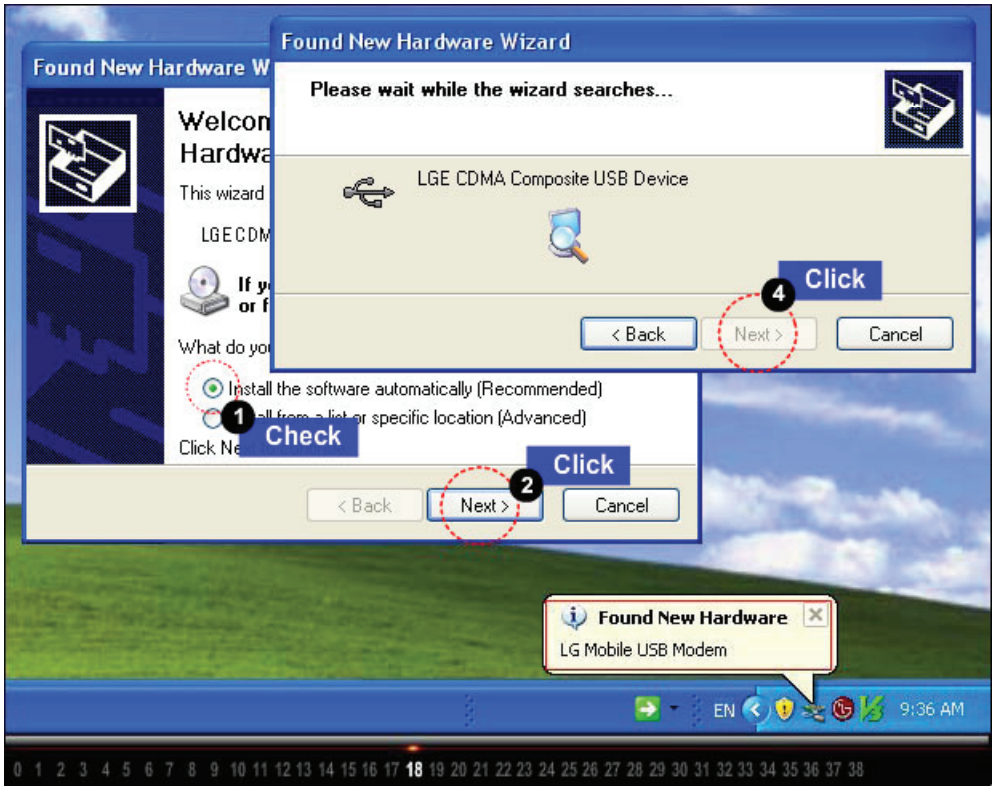


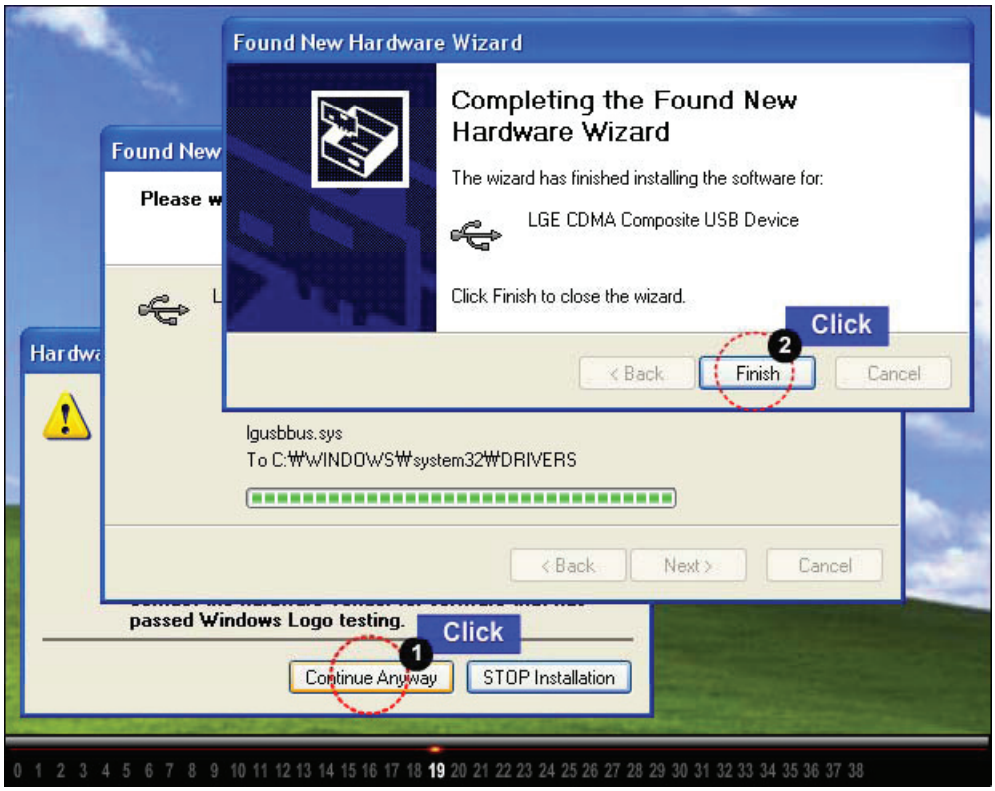


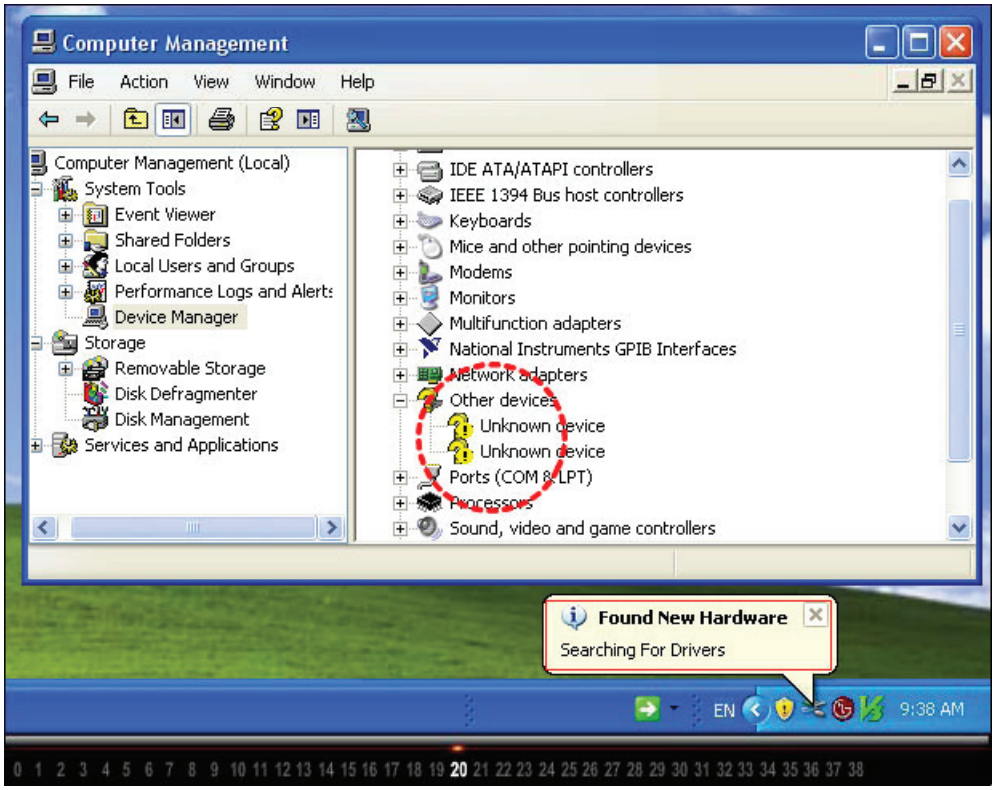


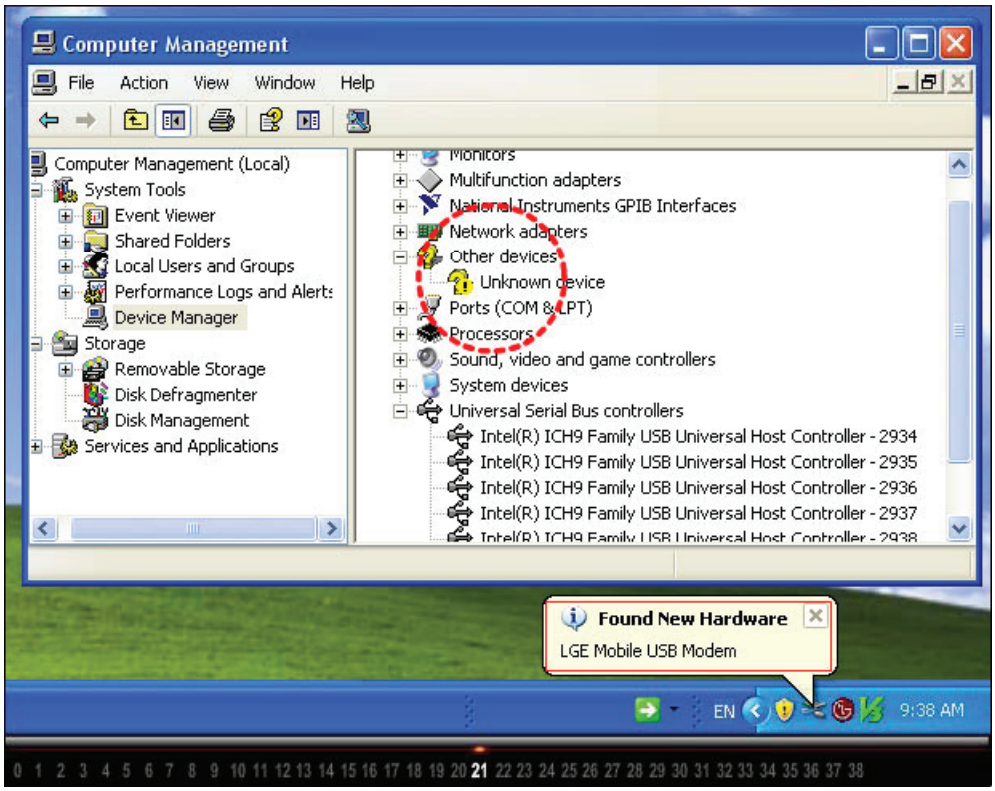


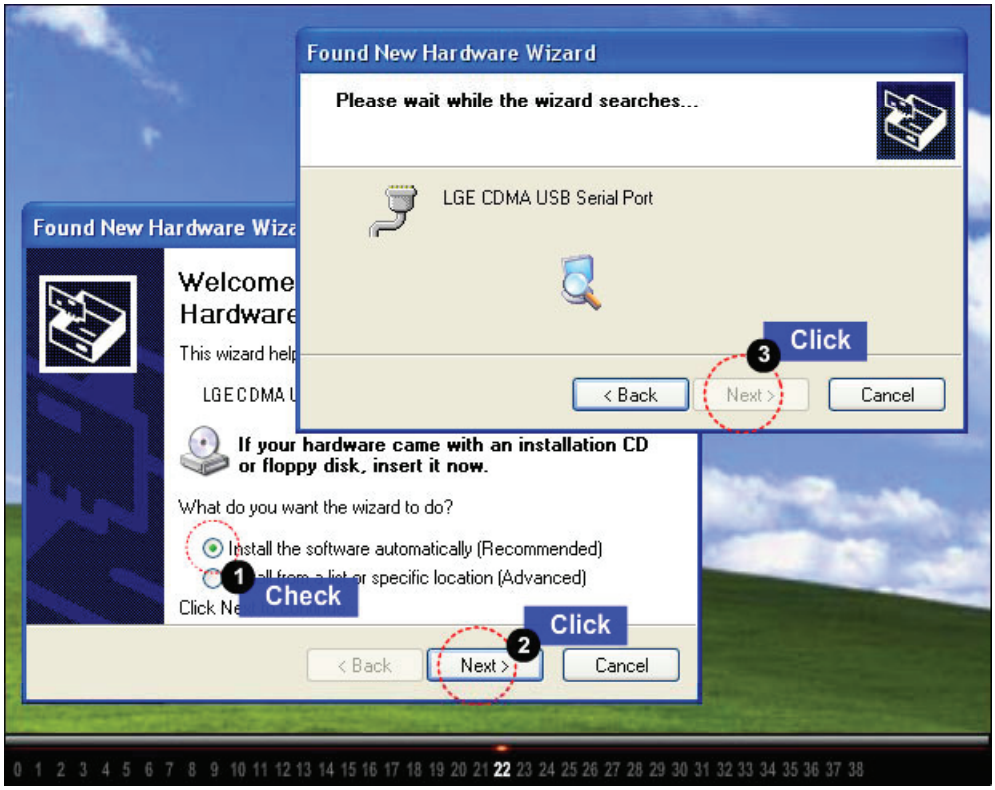


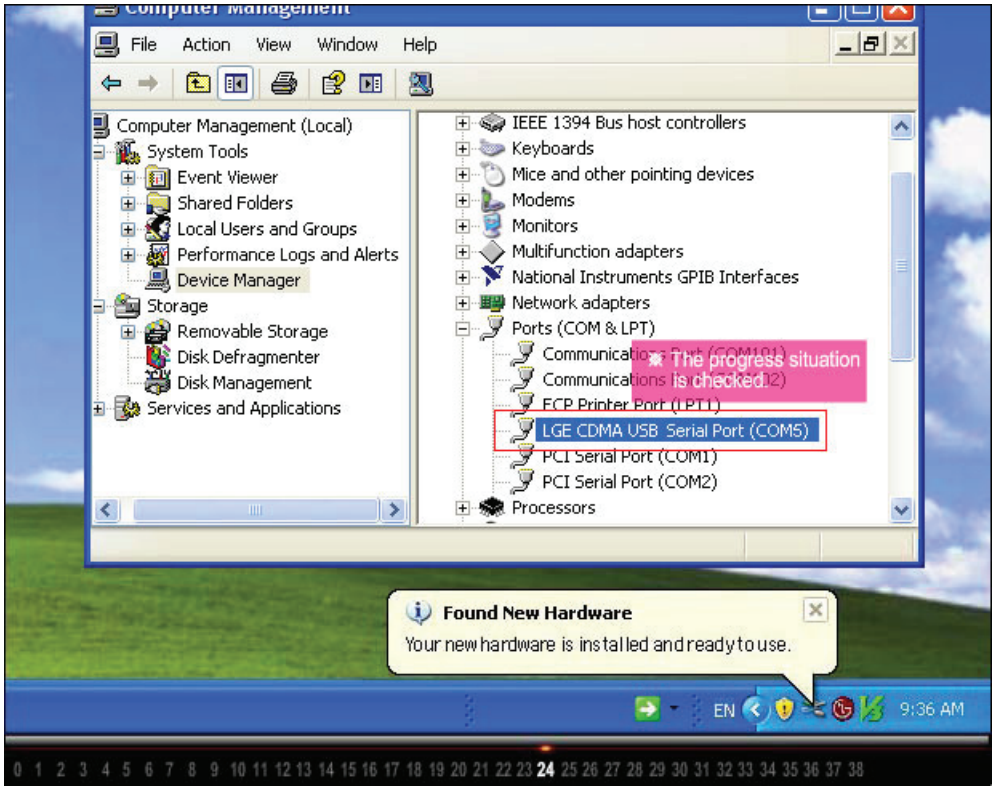


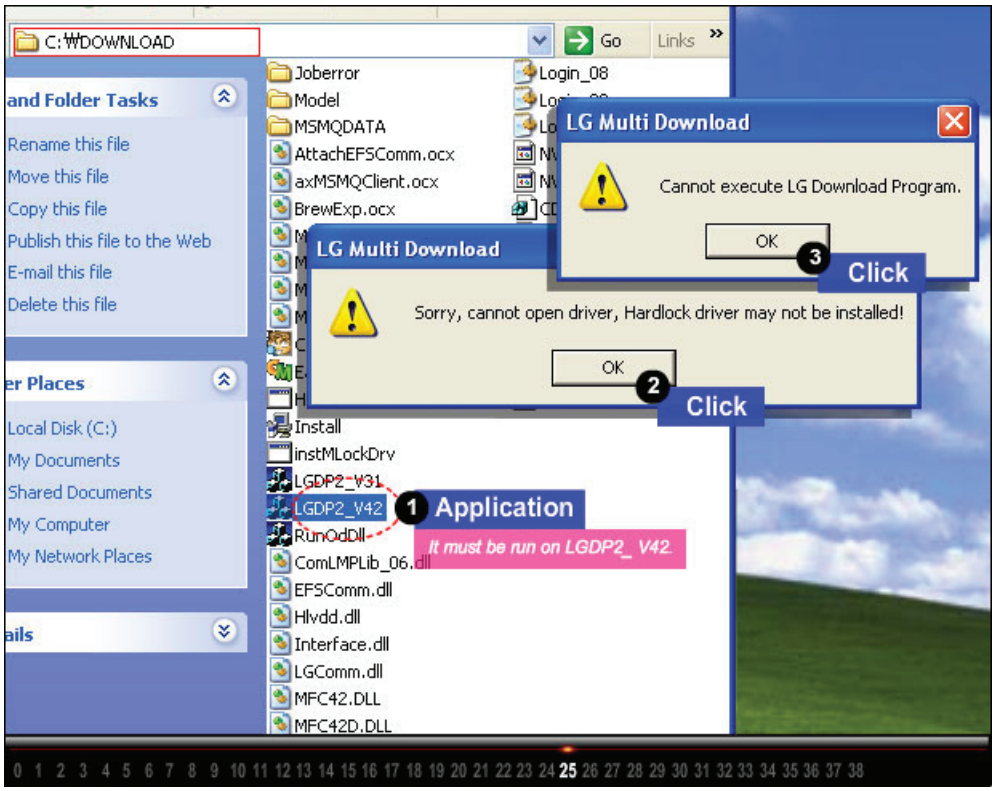


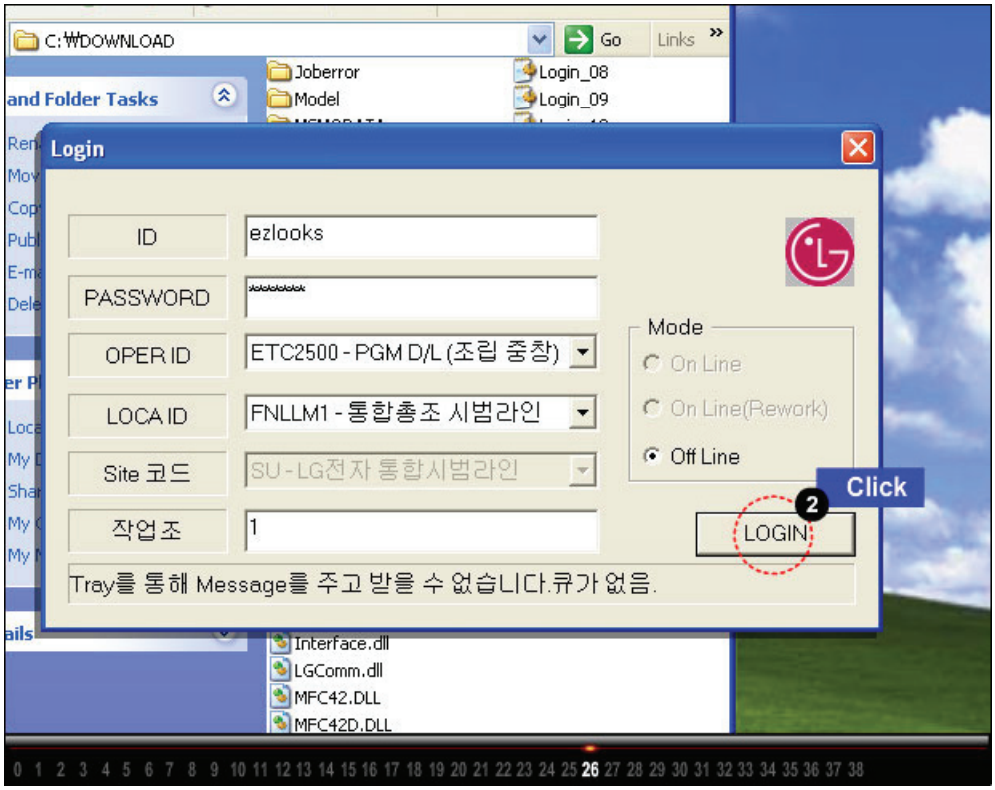


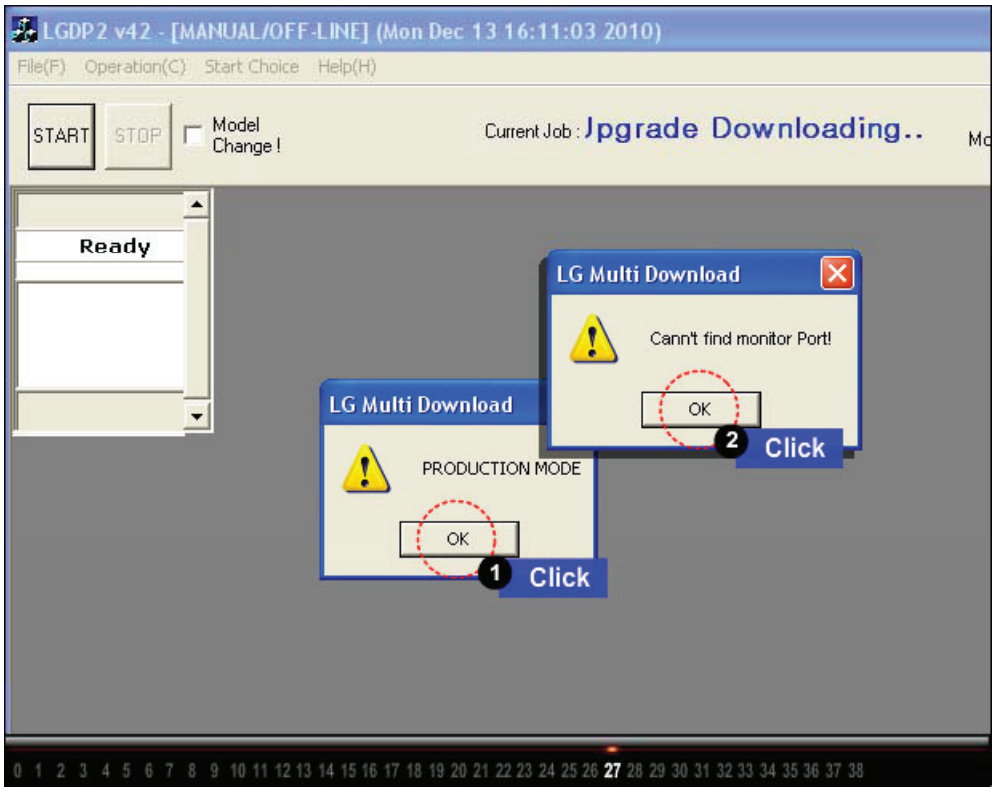


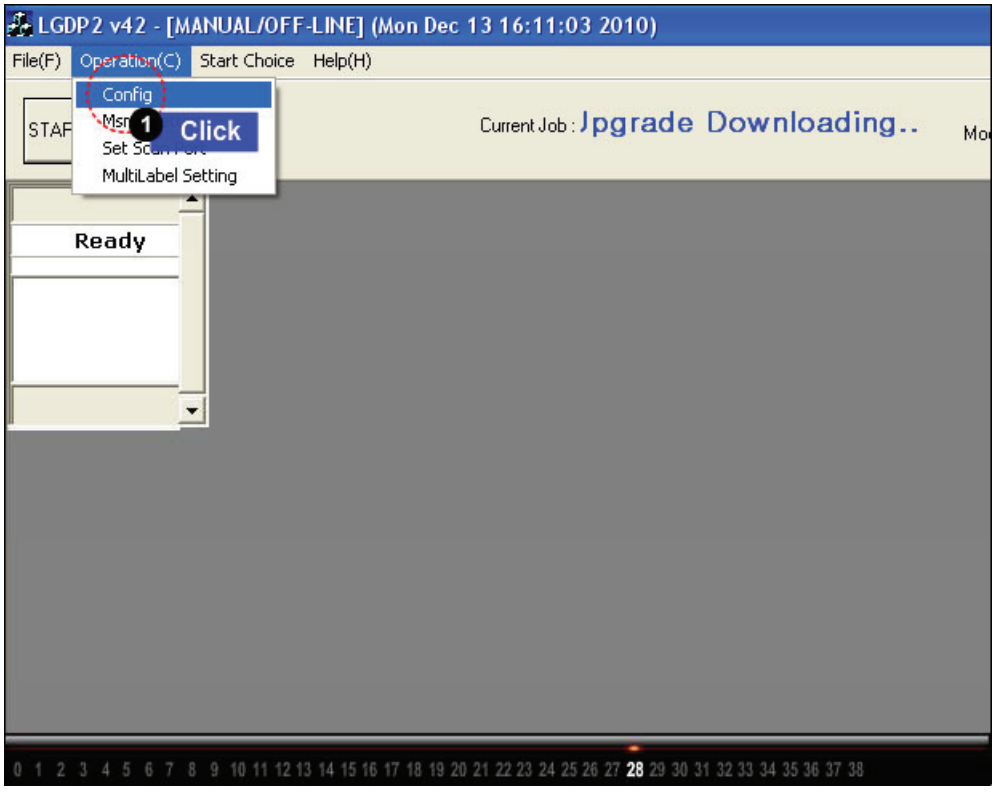


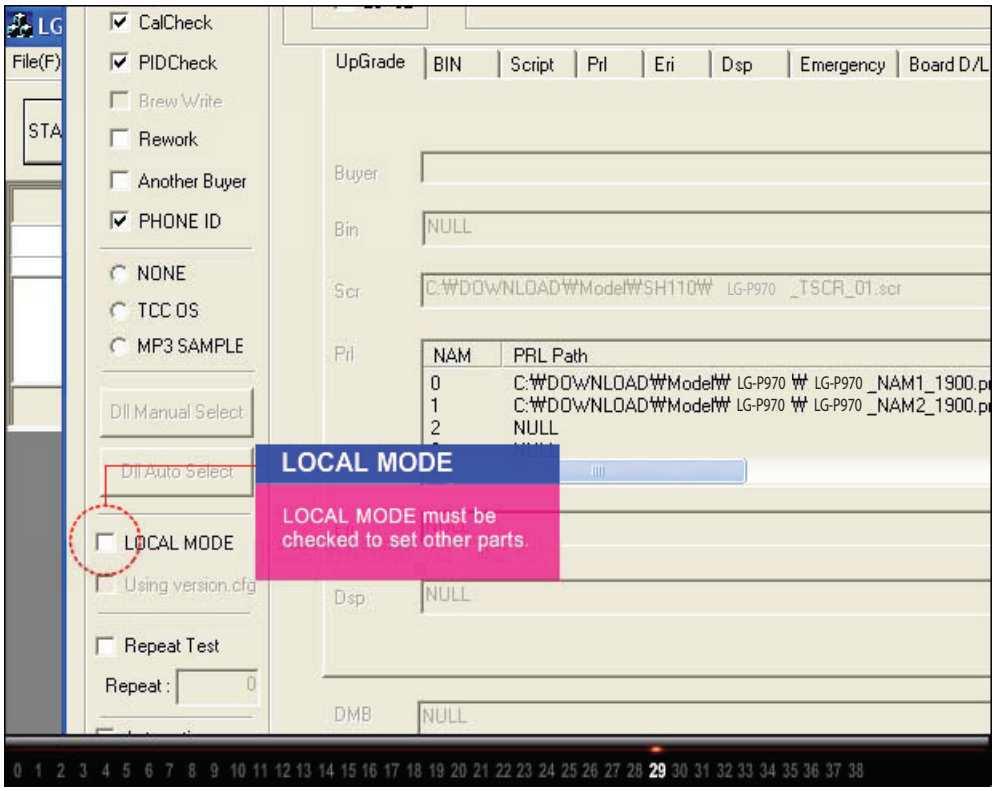


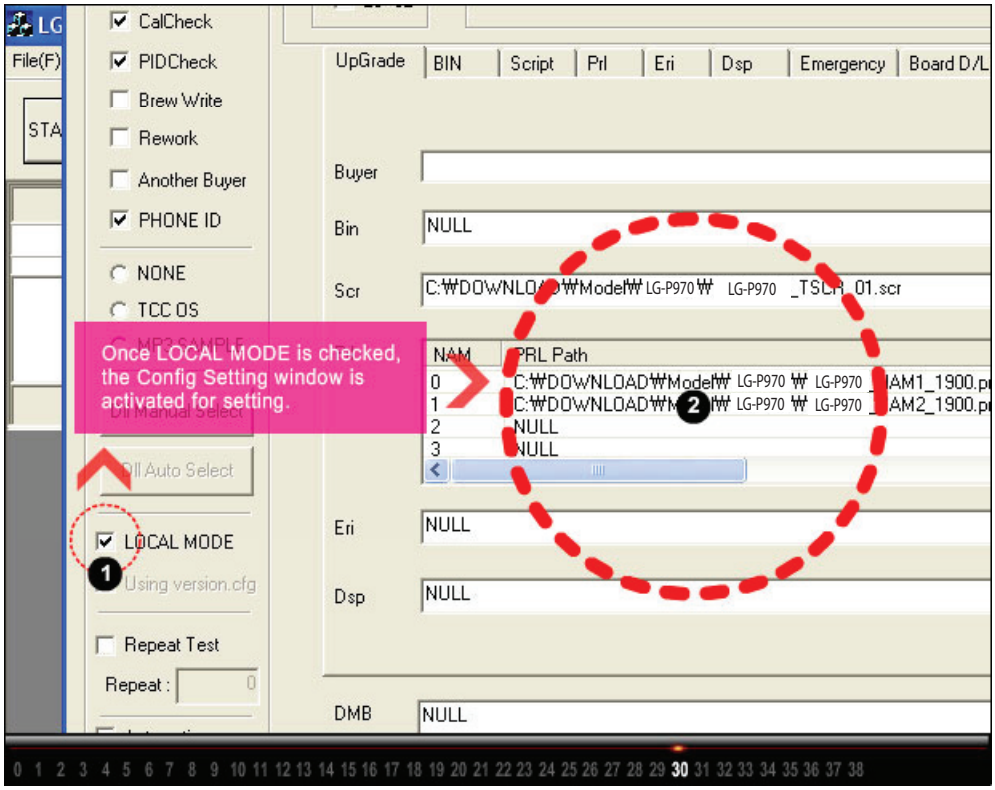


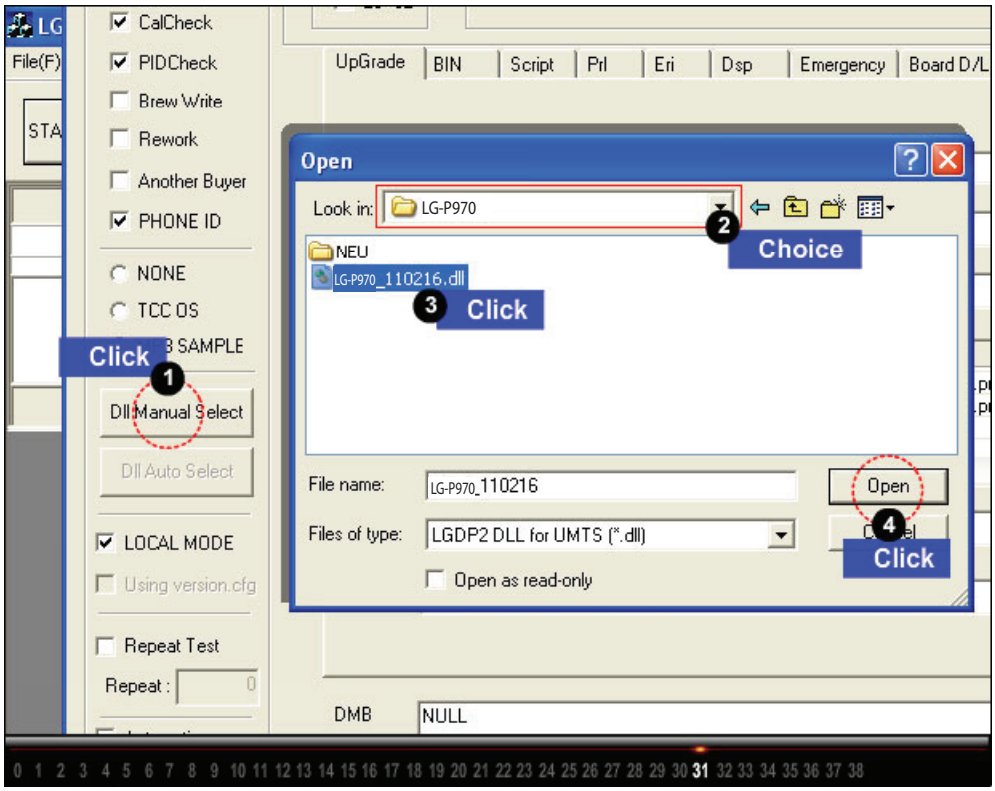


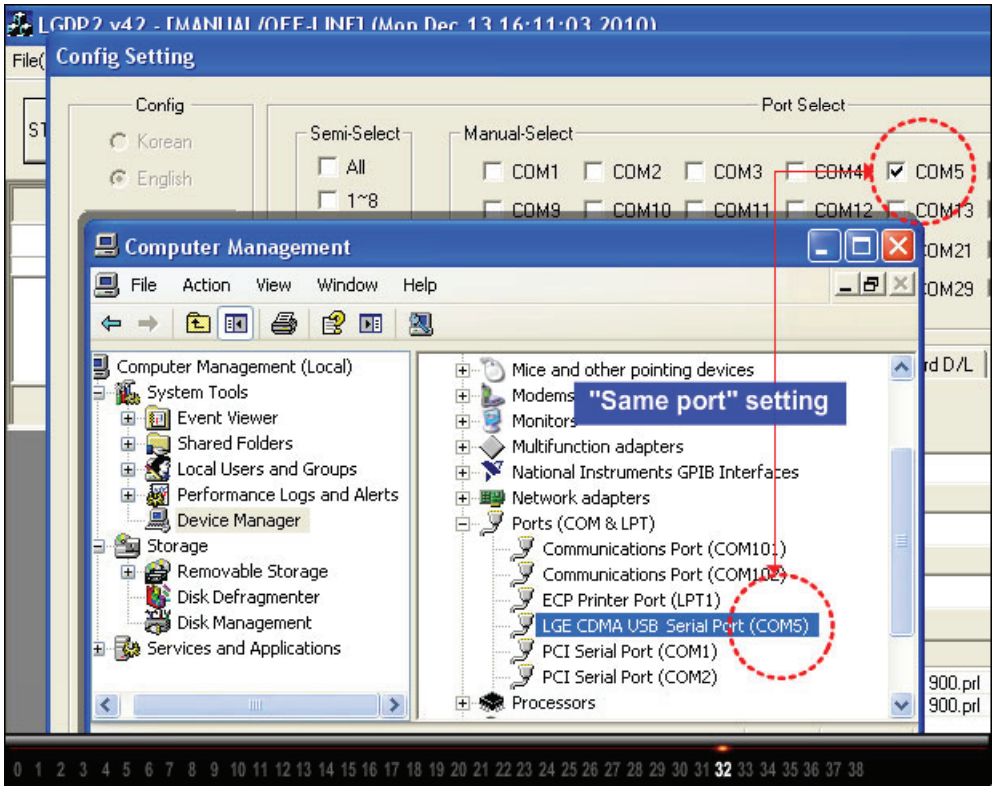


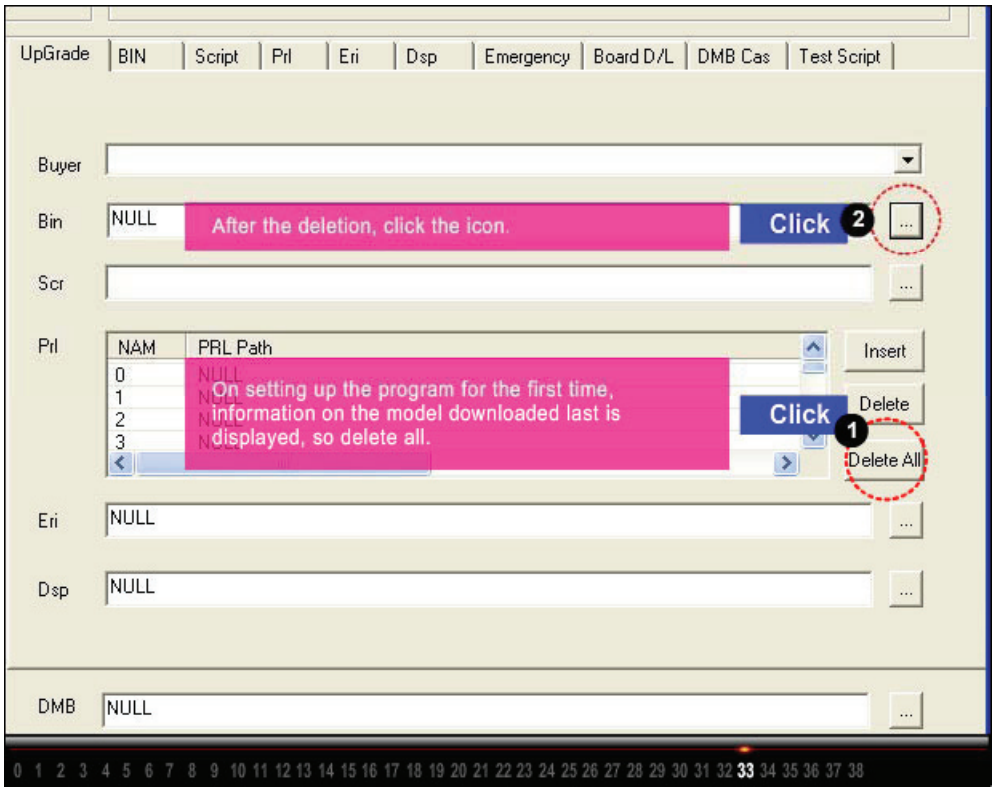


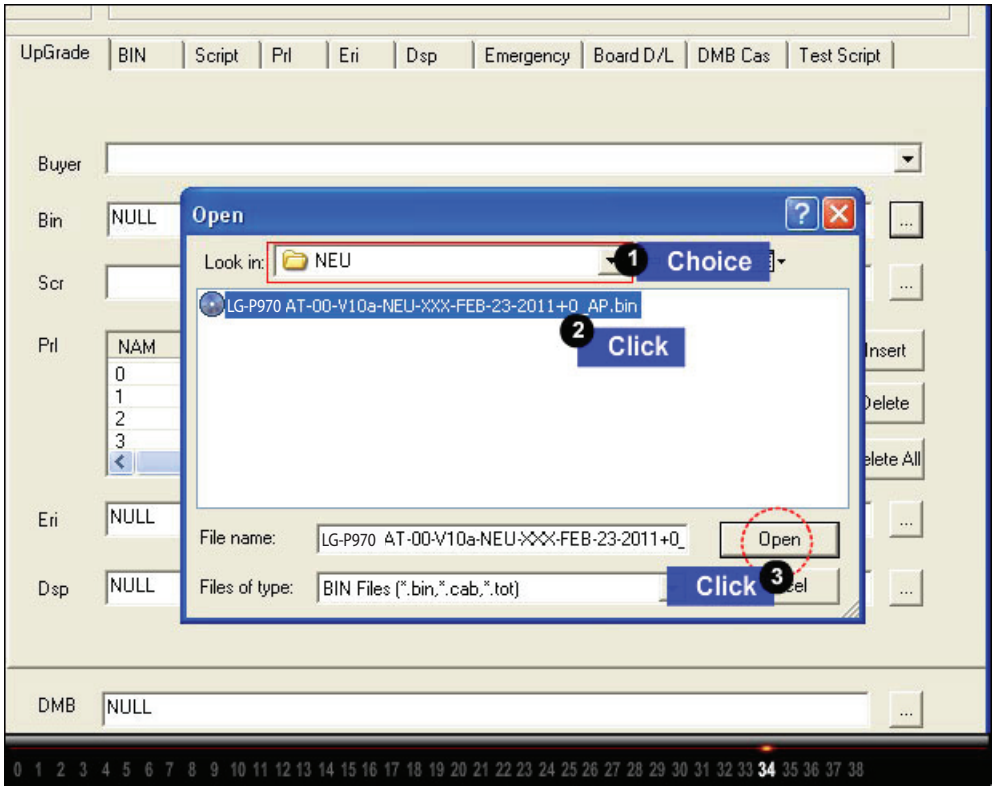


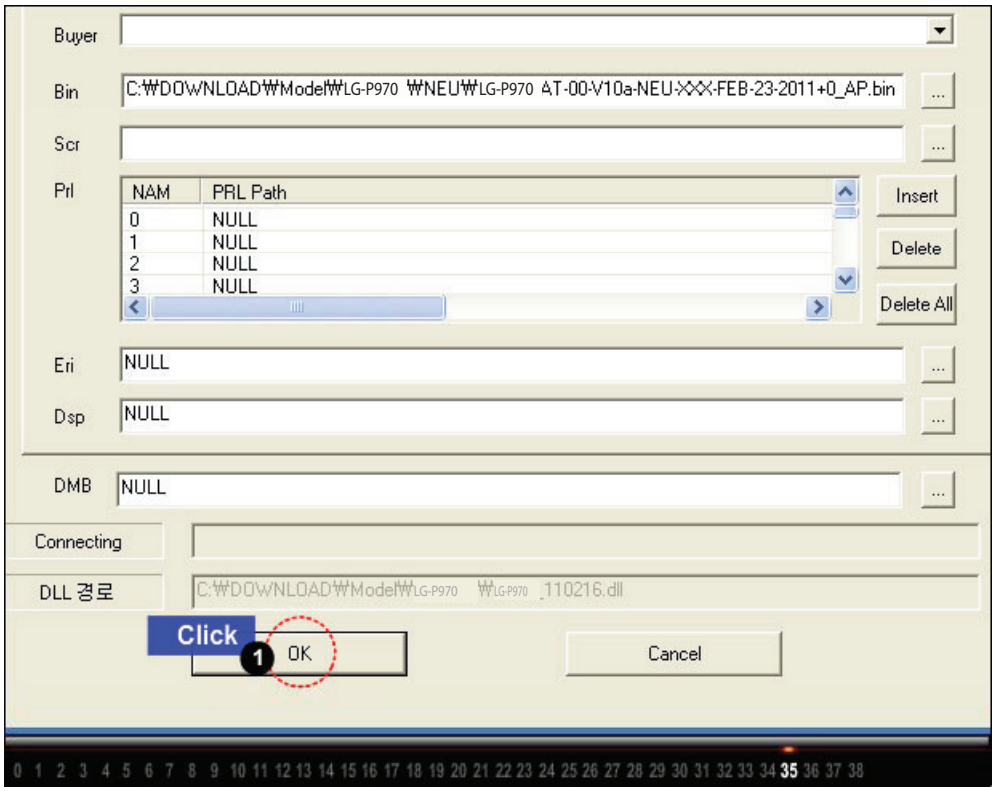


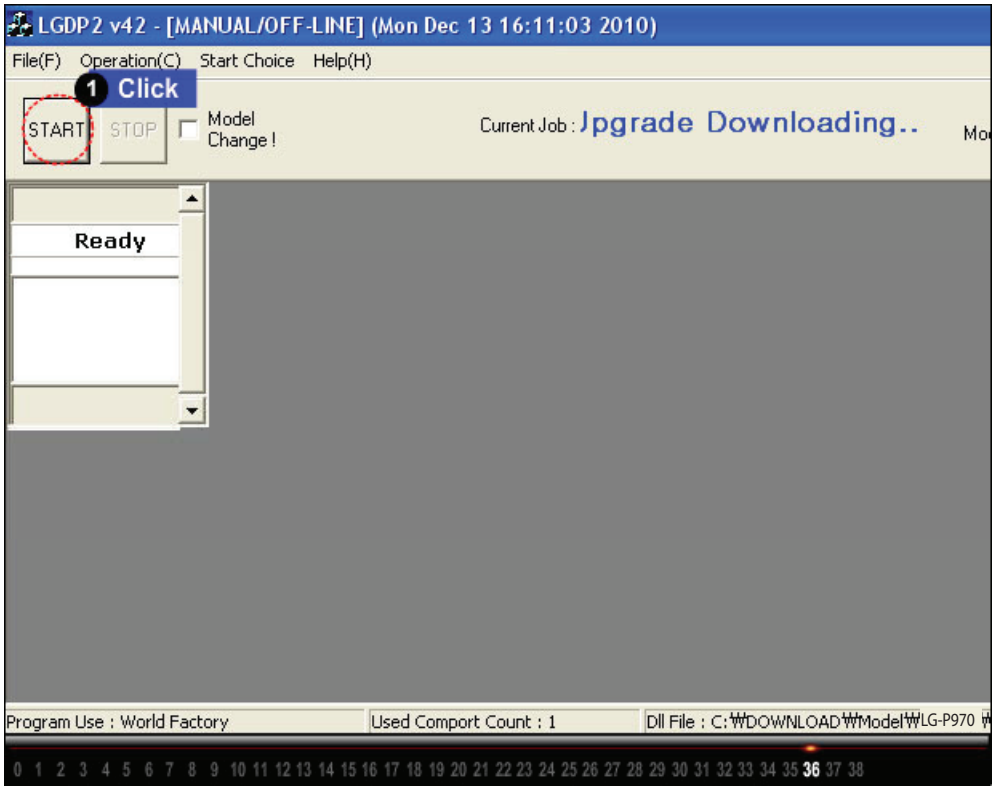


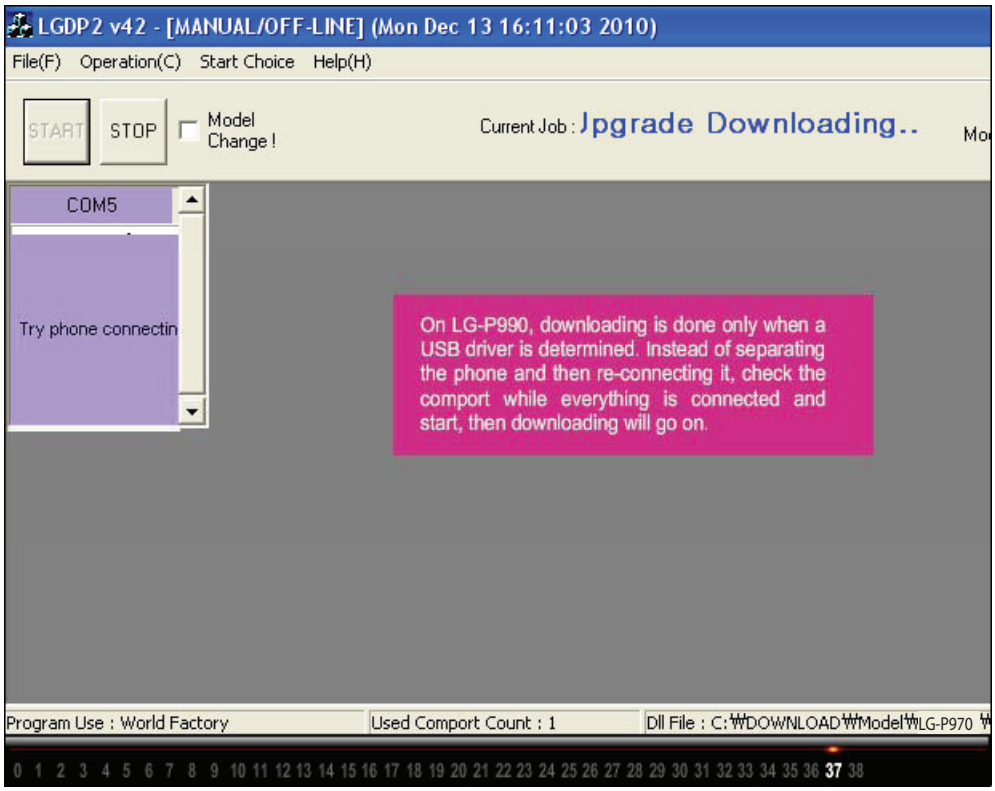


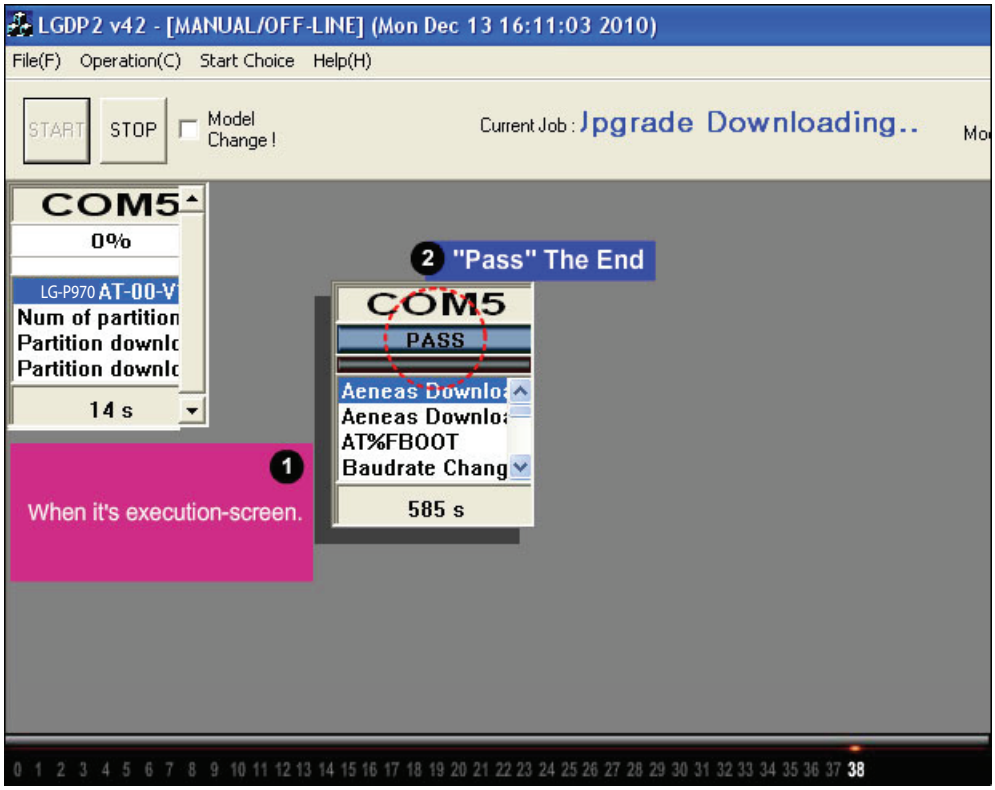




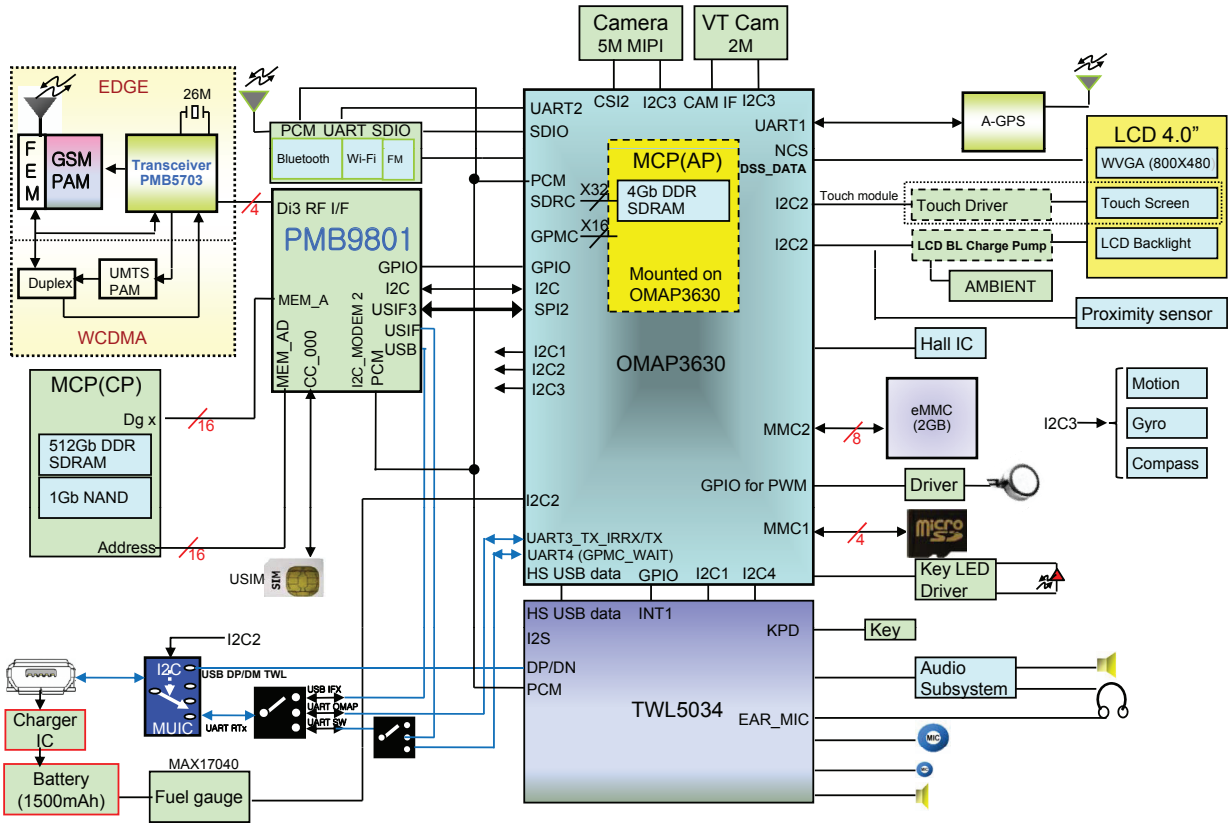


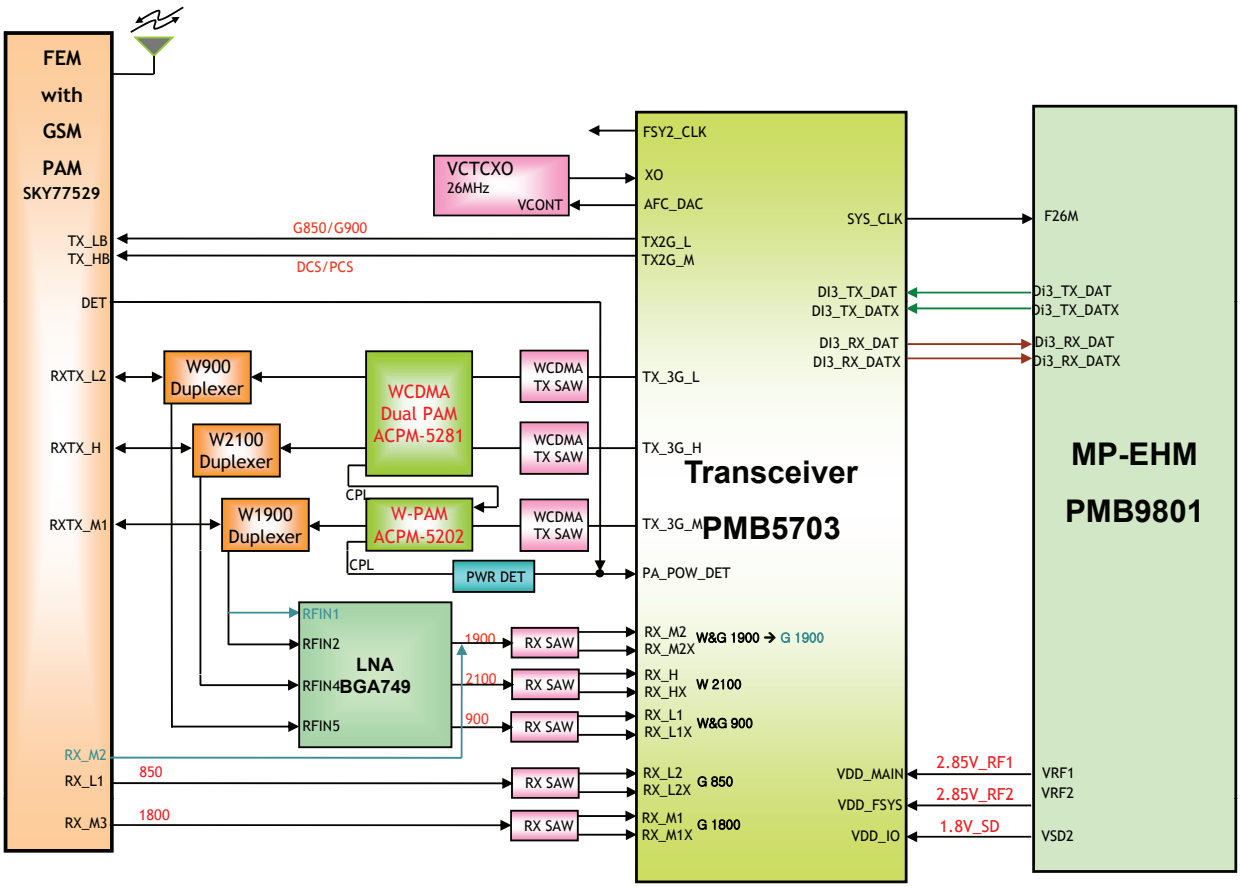


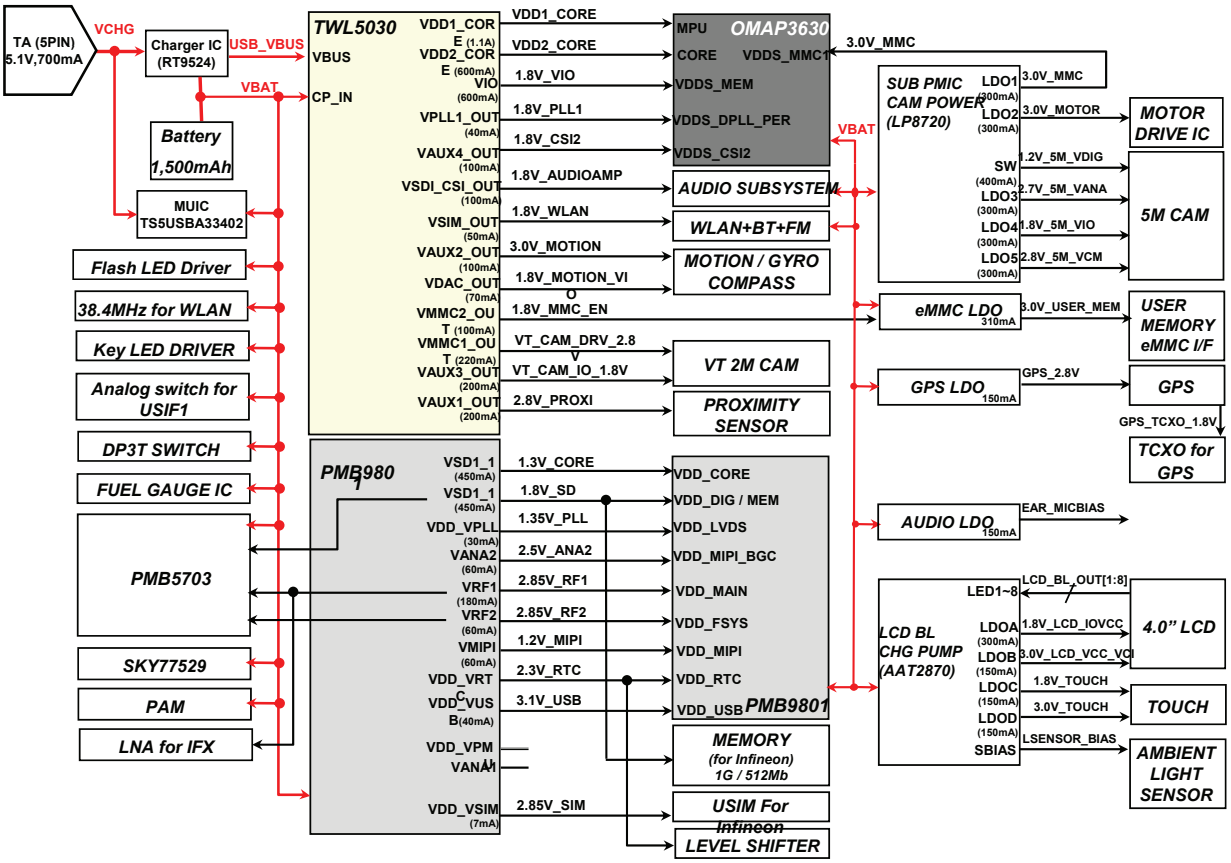




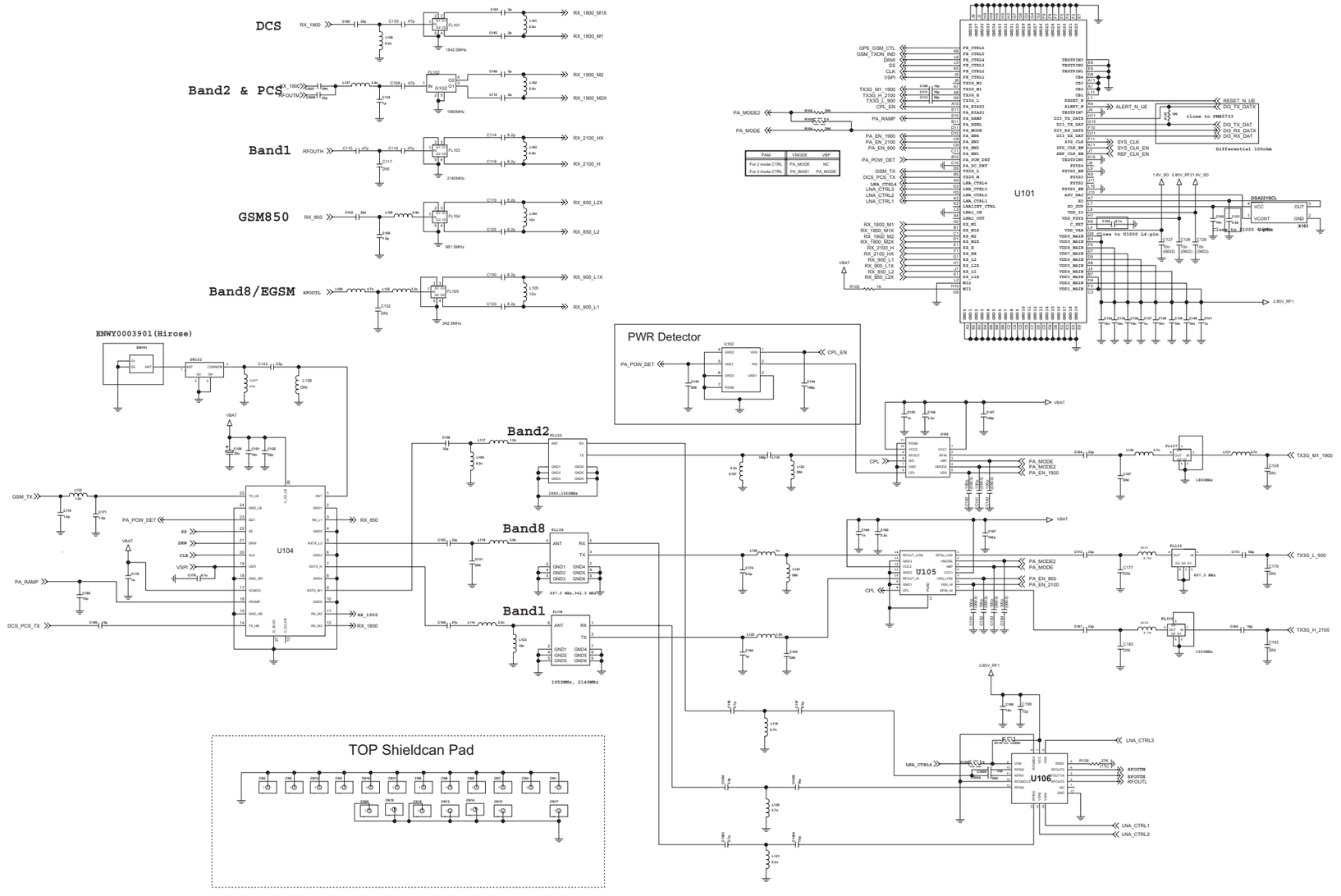
6.Block diagram



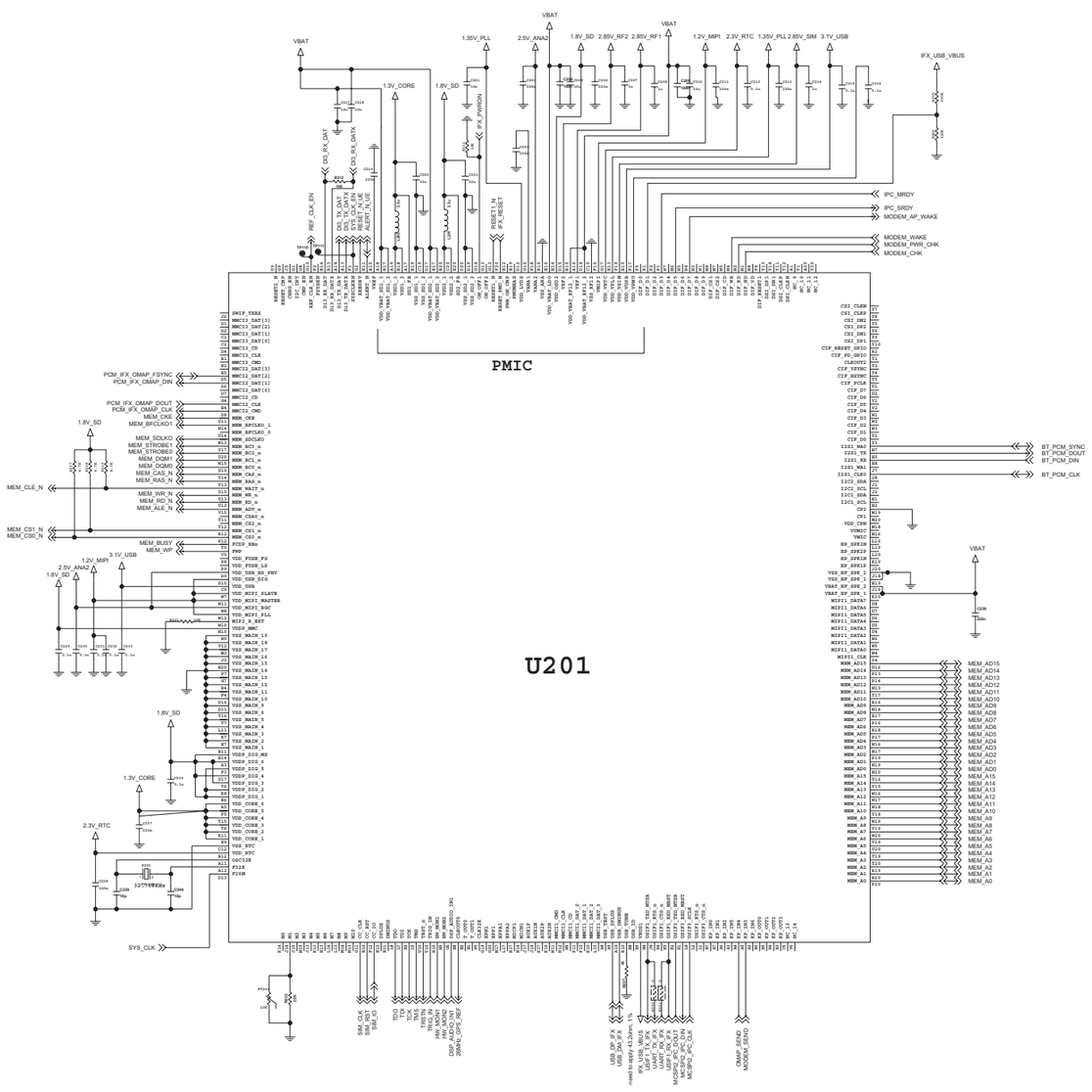




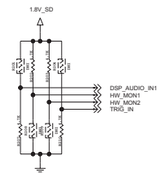
7. CIRCUIT DIAGRAM



BASE BAND PROCESSOR(PM9801)

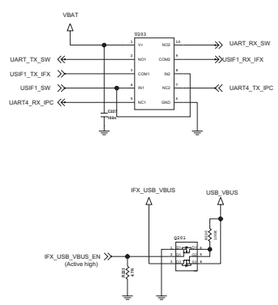


BOOT CONFIGURATION

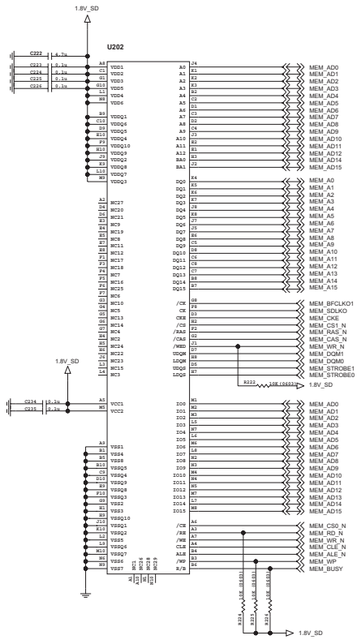


	DSP_AUDIO_IN1	HW_MON1	HW_MON2	TRIG_IN
16-bit HWARD boot	0	1	1	0
Flashless boot	1	1	1	0
MDM boot	0	0	1	0

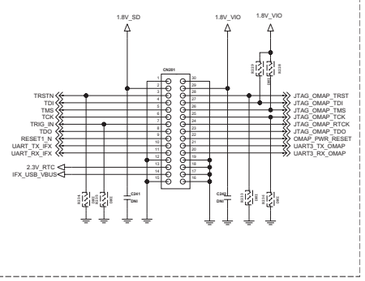
Analog switch for USIF1



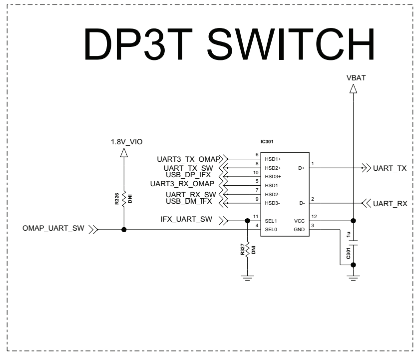
INFINEON MEMORY

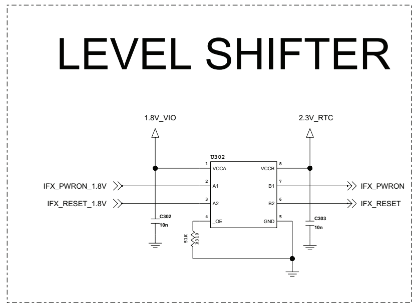


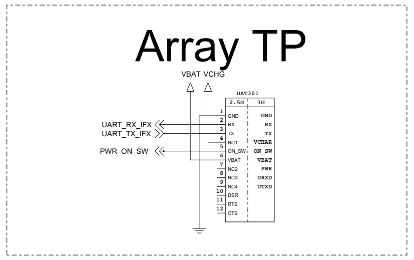
DUMMY INTERFACE

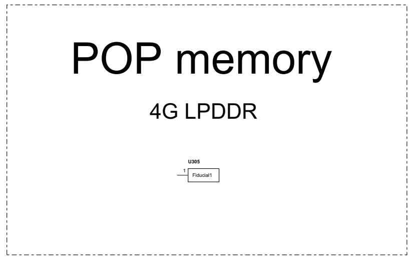


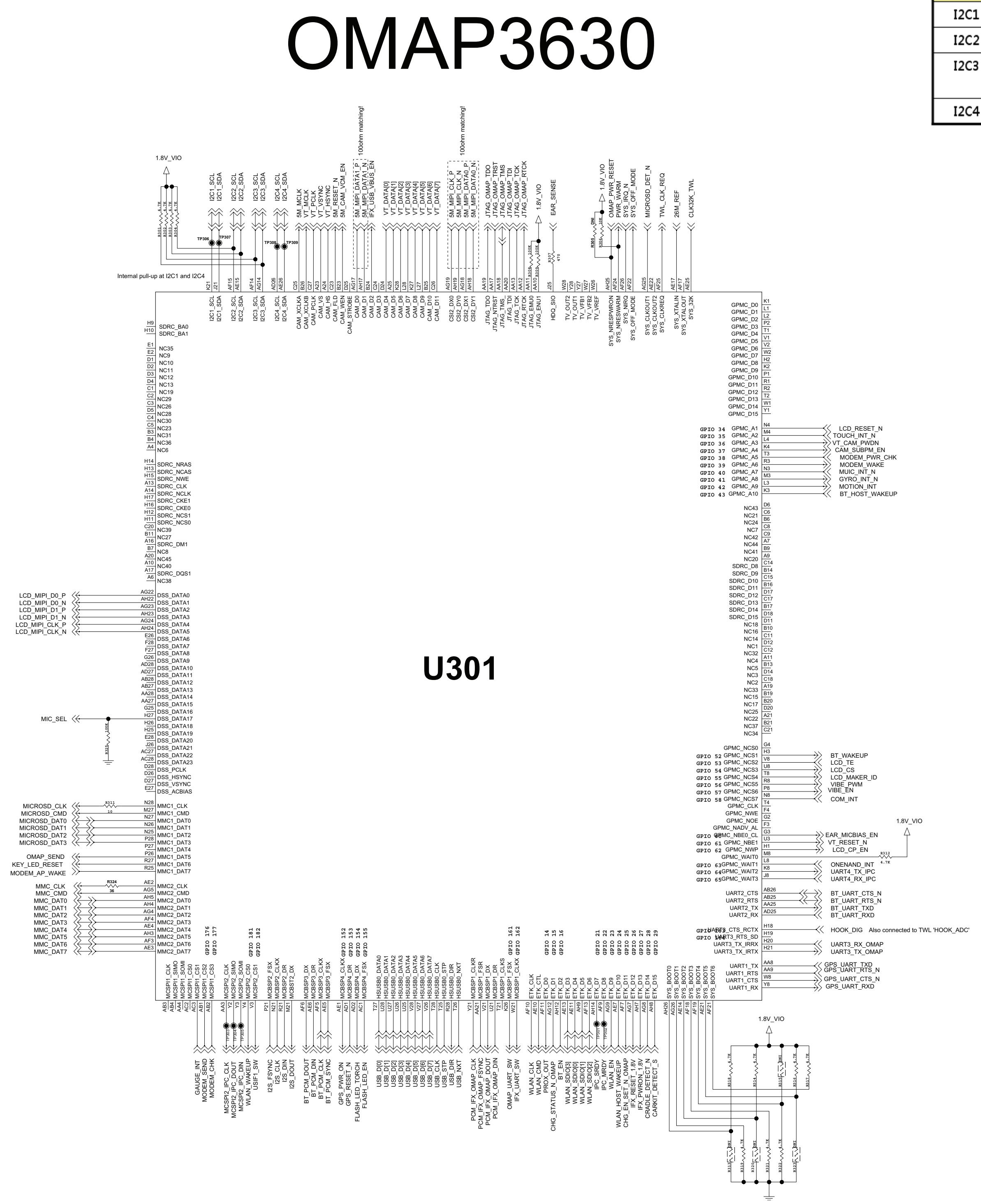
PORT	USAGE
I2C1	TWL5030
I2C2	AUDIO SUBSYSTEM, LCD BL CHR PUMP, TOUCH, MUIC
I2C3	5M/2M CAMERA, SUB PMIC, GYRO, COMPASS, PROXIMITY SENSOR
I2C4	TWL5030 FOR SMART REFLEX







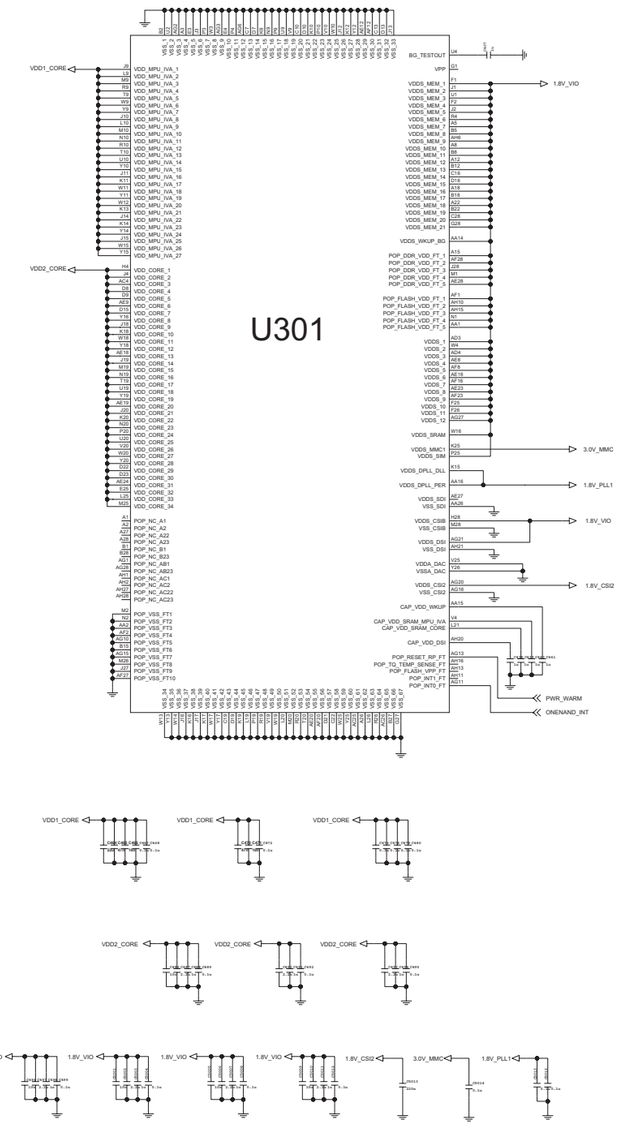




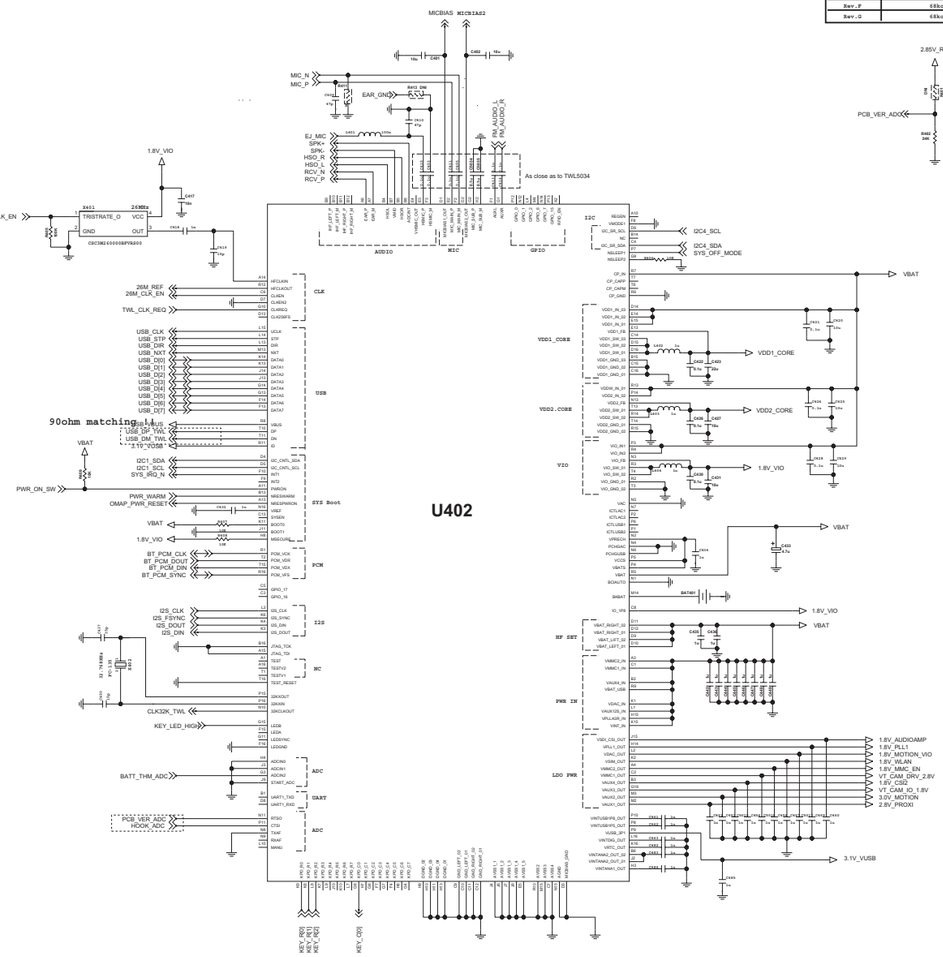
BOOT CONFIGURATION

	SYS_BOOT0	SYS_BOOT1	SYS_BOOT2	SYS_BOOT3	SYS_BOOT4	SYS_BOOT5	SYS_BOOT6
OneNAND boot	0	0	0	0	1	0	1
eMMC boot	1	0	1	0	0	1	1
External boot	0	0	1	0	0	1	1

OMAP3x30 Power



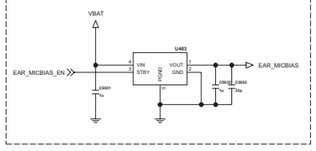
TWL5034



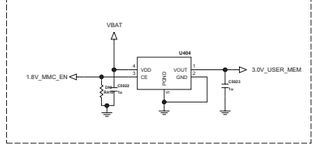
Resistane depending on PCB revision

Revision	Resistance
Rev.A	68kohm / 6.2kohm
Rev.B	68kohm / 10kohm
Rev.C	68kohm / 15kohm
Rev.D	68kohm / 20kohm
Rev.E	68kohm / 24kohm
Rev.F	68kohm / 30kohm
Rev.G	68kohm / 36kohm

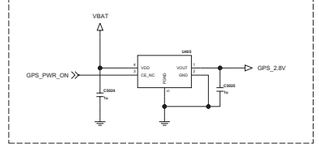
AUDIO LDO



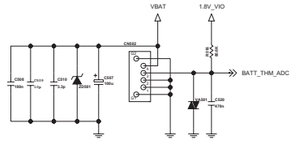
eMMC LDO



GPS LDO

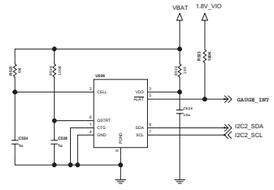


BATTERY CONNECTOR

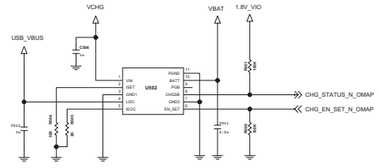


Change to 4 Pin type if neccessory

FUEL GAUGE IC
MAX17043(TEST)

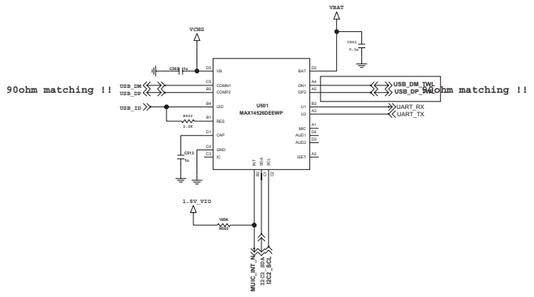


CHARGER IC
Close to batt. connector

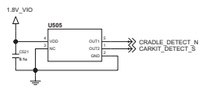


GND pad on the bottom of chip has to be connected to main GND trace through many vias for heat emission.

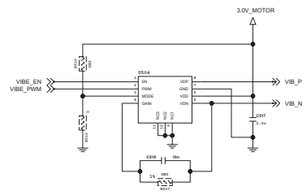
MUIC



Hall IC

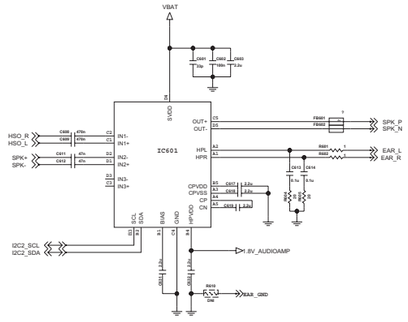


MOTOR DRIVER

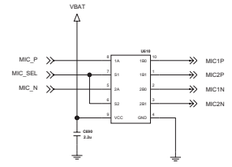


SCREW HOLE

AUDIO SUBSYSTEM

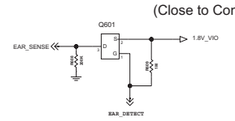


MIC Switch

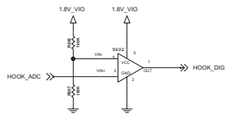


EAR DETECTION

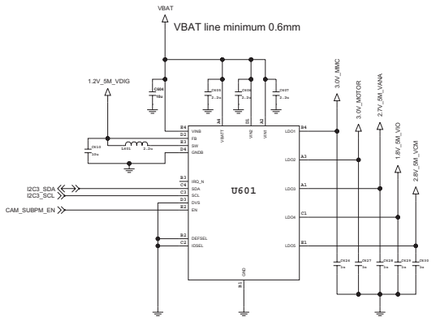
(Close to Connector)



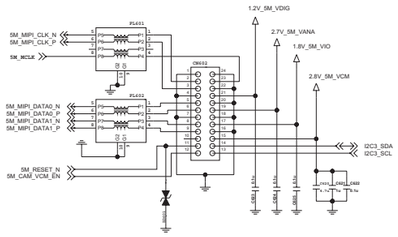
HOOK



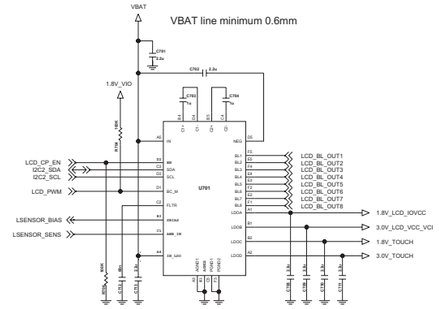
SUB PMIC-CAM POWER



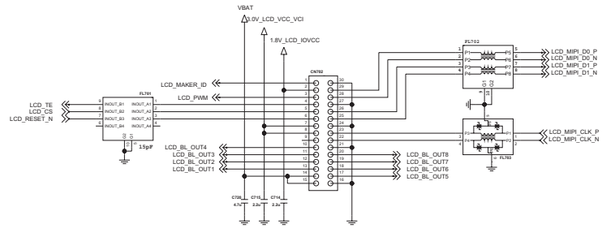
5M_MAIN_CAMERA



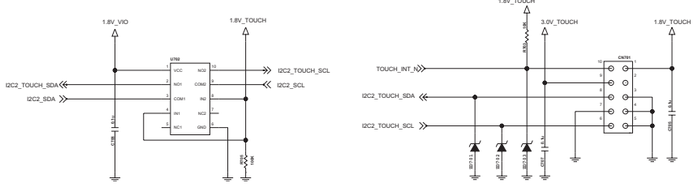
LCD BL CHARGE PUMP



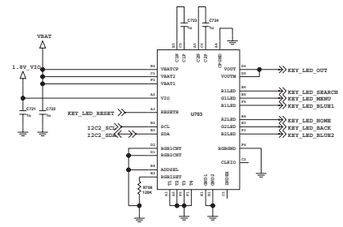
4.0" MIPI LCD



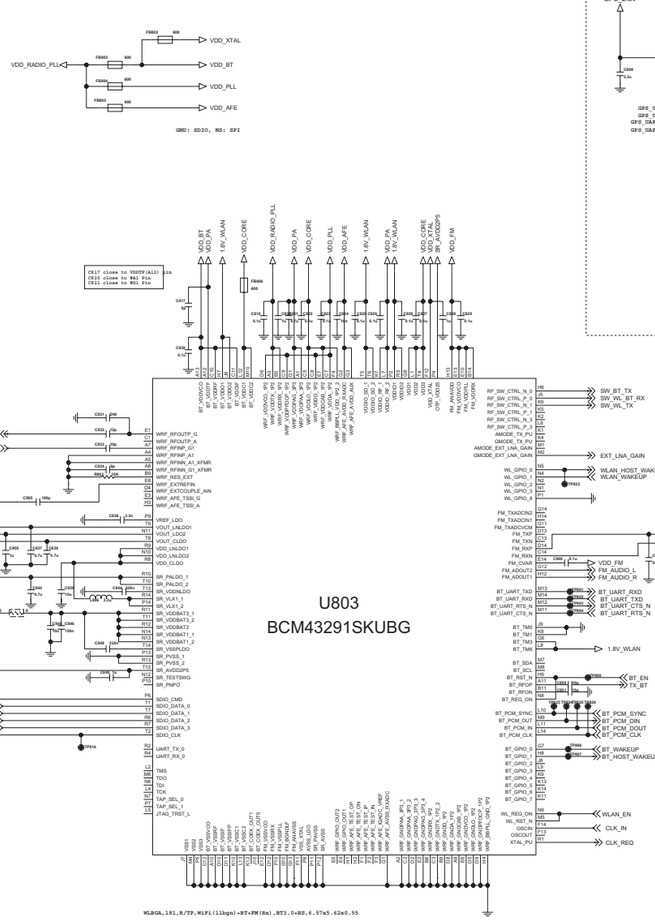
TOUCH CONNECTOR



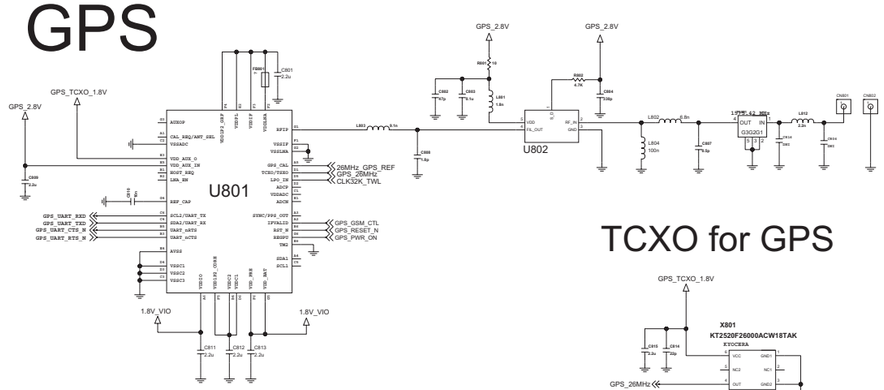
RGB LED DRIVER



WIFI/BT/FM COB

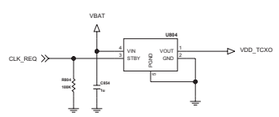


GPS

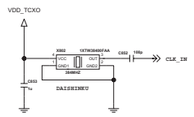


TCXO for GPS

LDO for TCXO

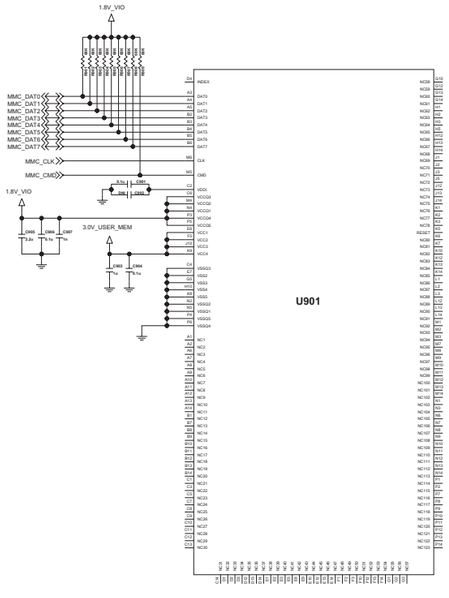


38.4MHz TCXO

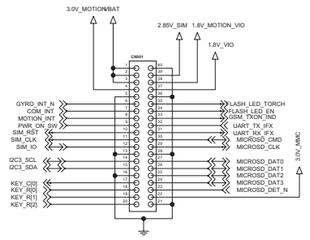


USER MEMORY eMMC I/F

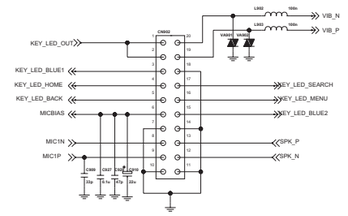
2GB



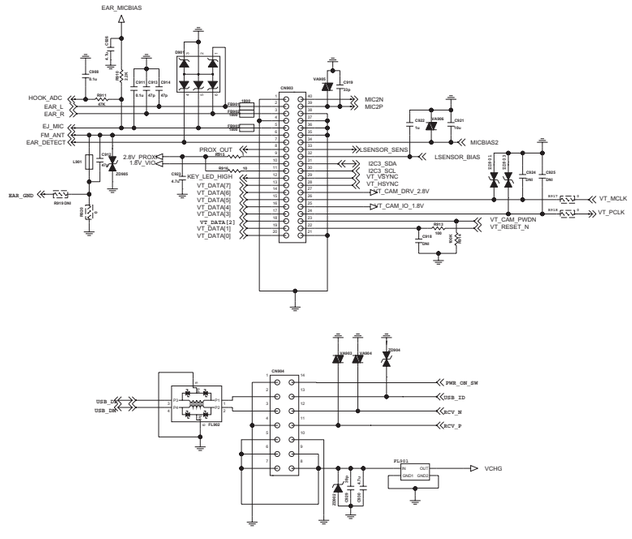
Main 2 Sub



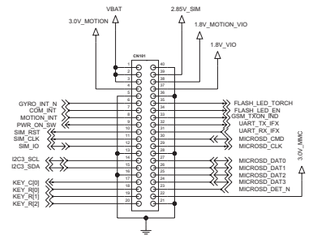
Main 2 ANT Sub



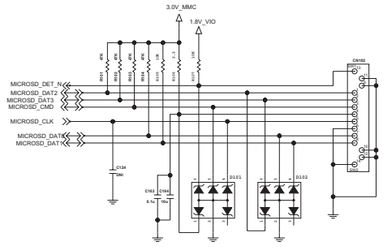
Main 2 USB FPCB



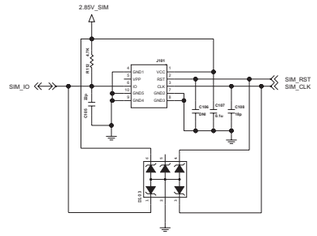
Main 2 Sub



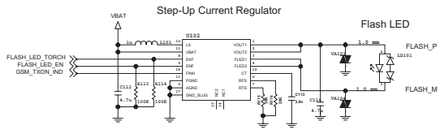
MicroSD Socket



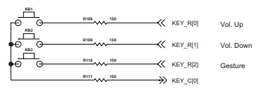
USIM For Infinieon



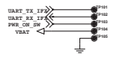
Flash LED Driver



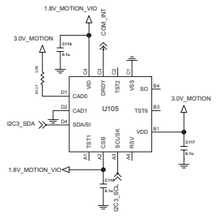
VOLUME/GESTURE KEY



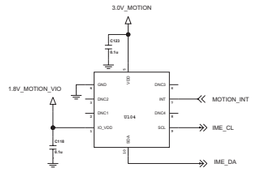
TP



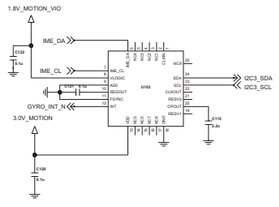
DIGITAL COMPASS



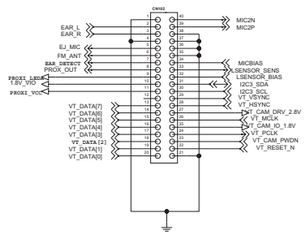
MOTION SENSOR



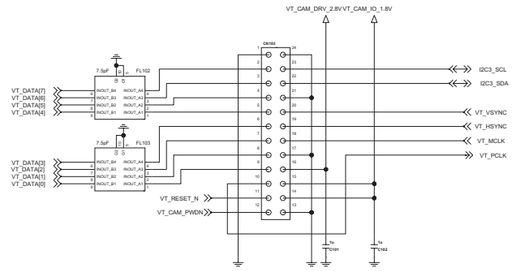
GYRO SENSOR



VT FPCB



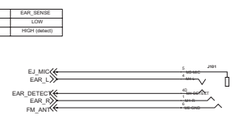
VT 2M CAM



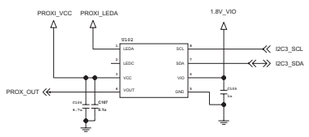
Sub MIC

3.5pi Ear Jack Connector

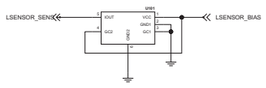
S/W	EAR_SENSE
Close	LOW
Open	HIGH (detect)



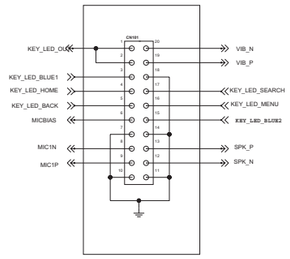
PROXIMITY SENSOR



AMBIENT LIGHT SENSOR

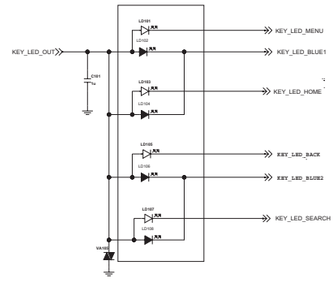


Main 2 Lower Sub

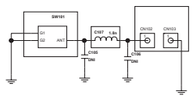


Q-Motor

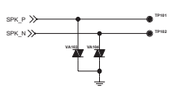
4KEY LED LIGHTING



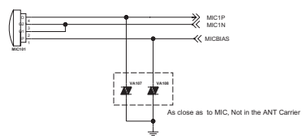
RF Mobile Switch



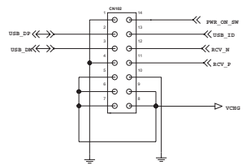
SPK



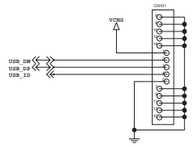
Main MIC



Main 2 USB FPCB

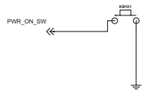


uUSB Connector



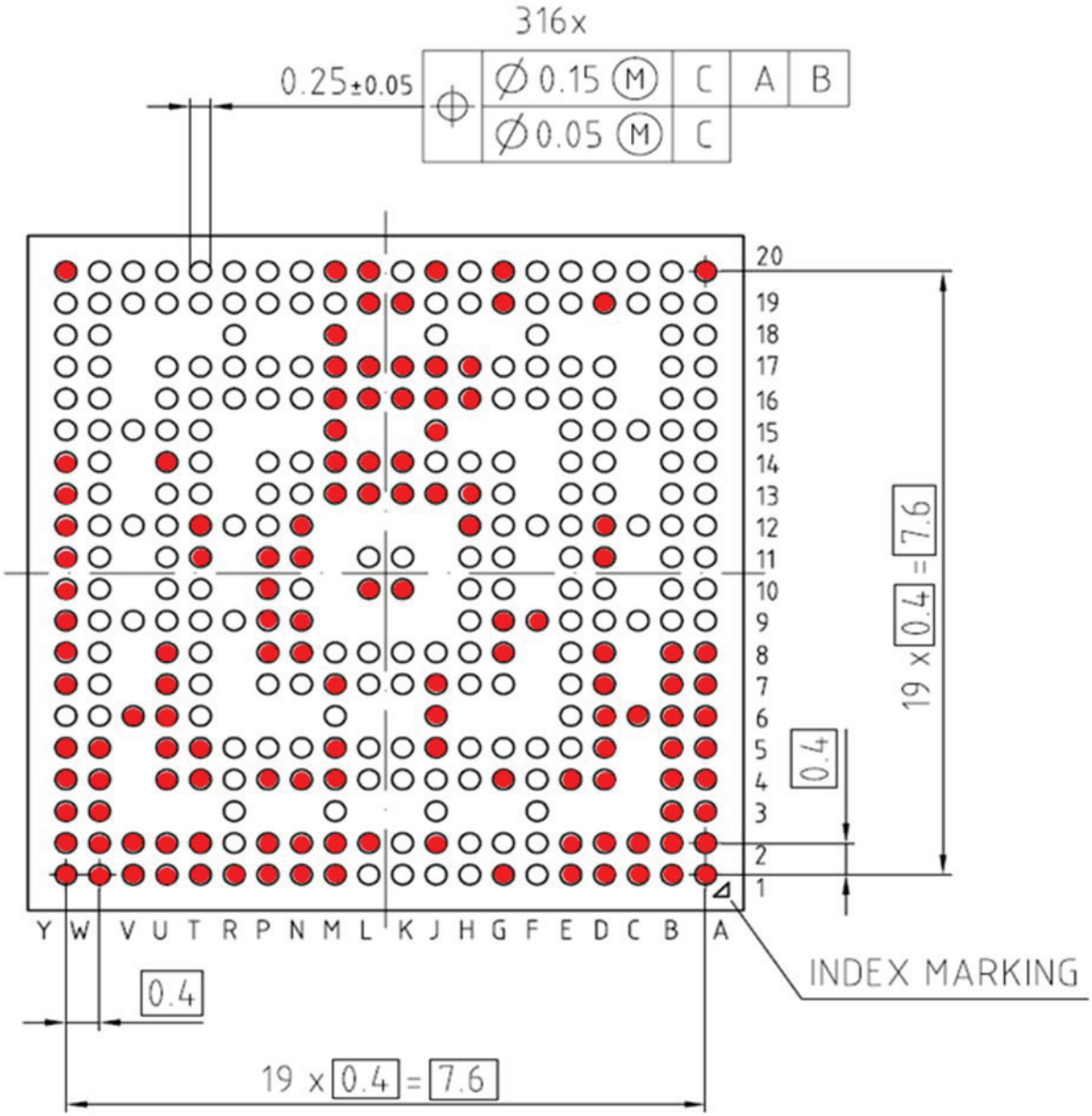
RCV

PWR ON

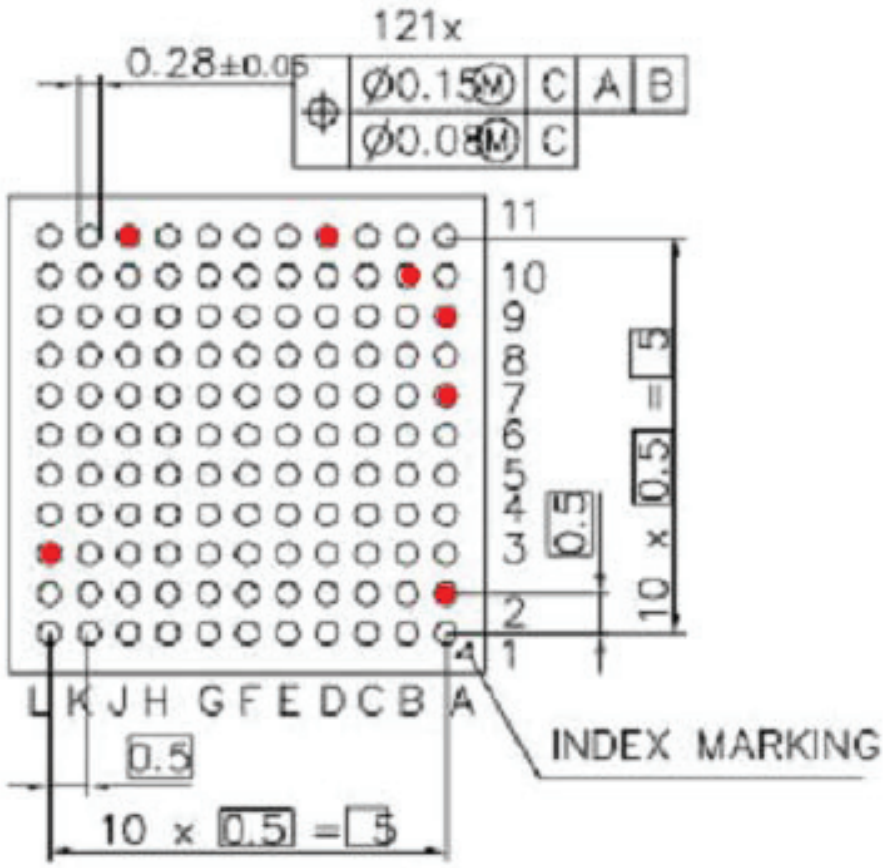


8. BGA PIN MAP

-PMB9801



-PMB5703

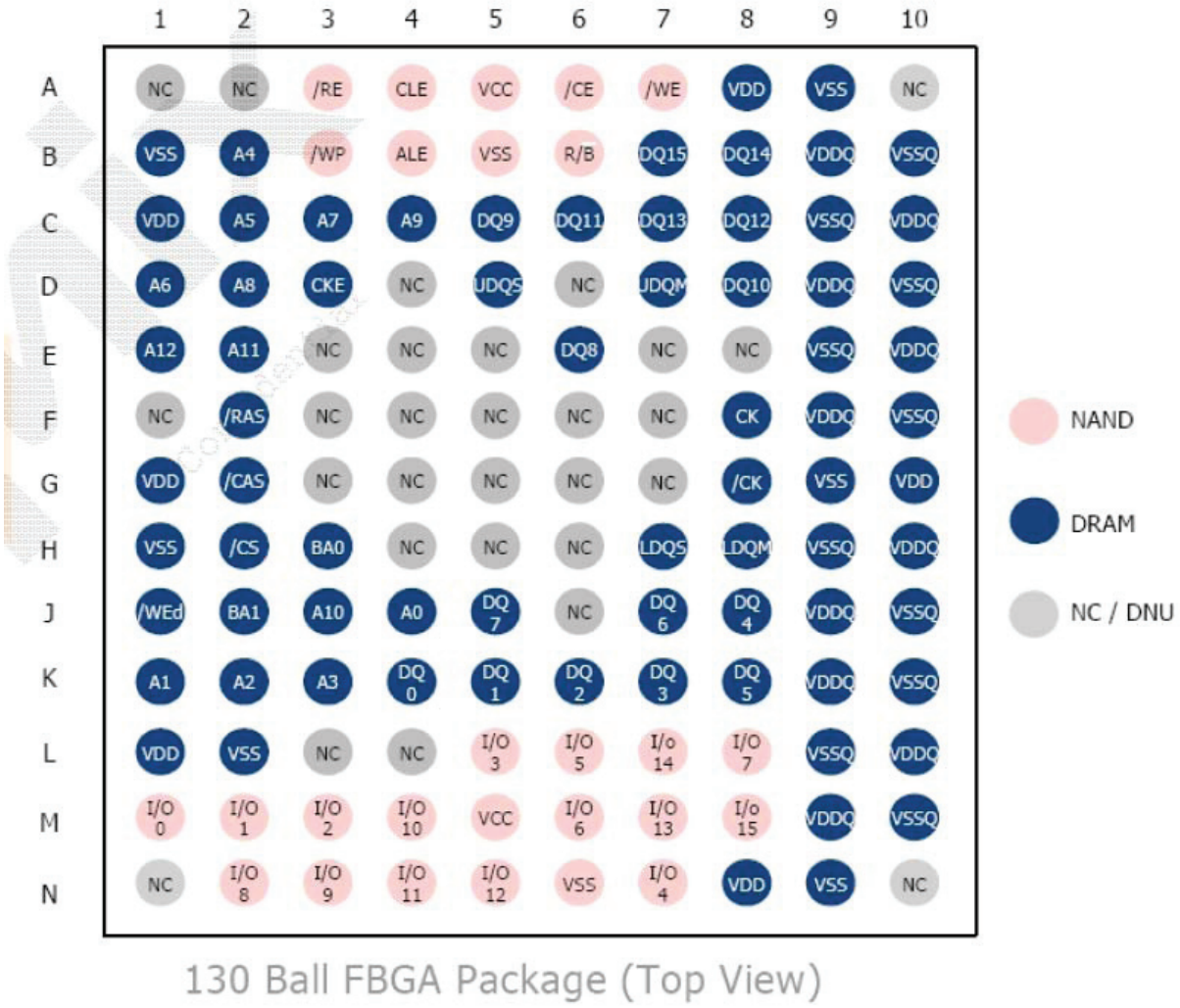


Not Used

Used

-H8BCS0QG0MMR-46M

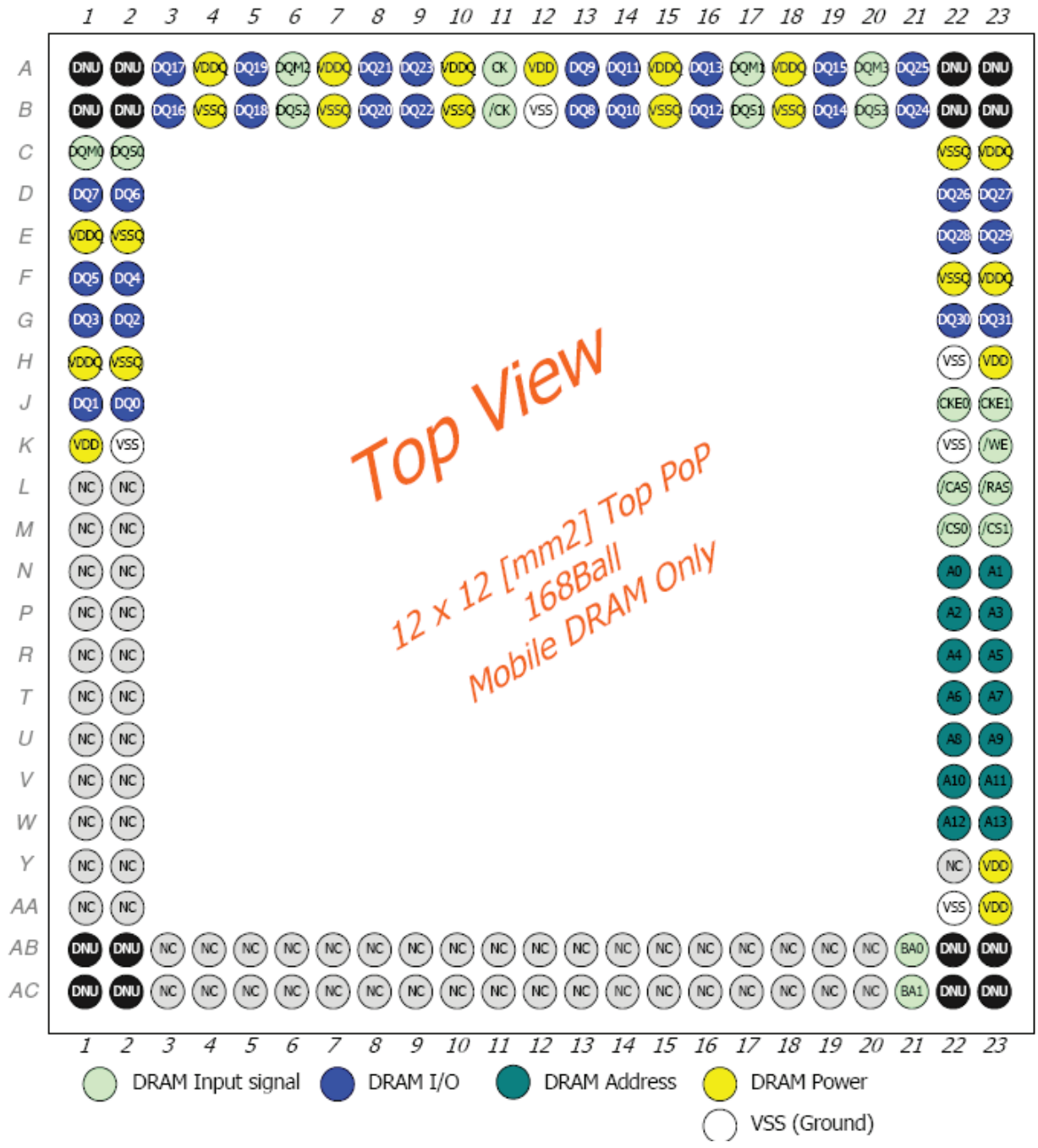
CP Memory (1G+512M)



130 Ball FBGA Package (Top View)

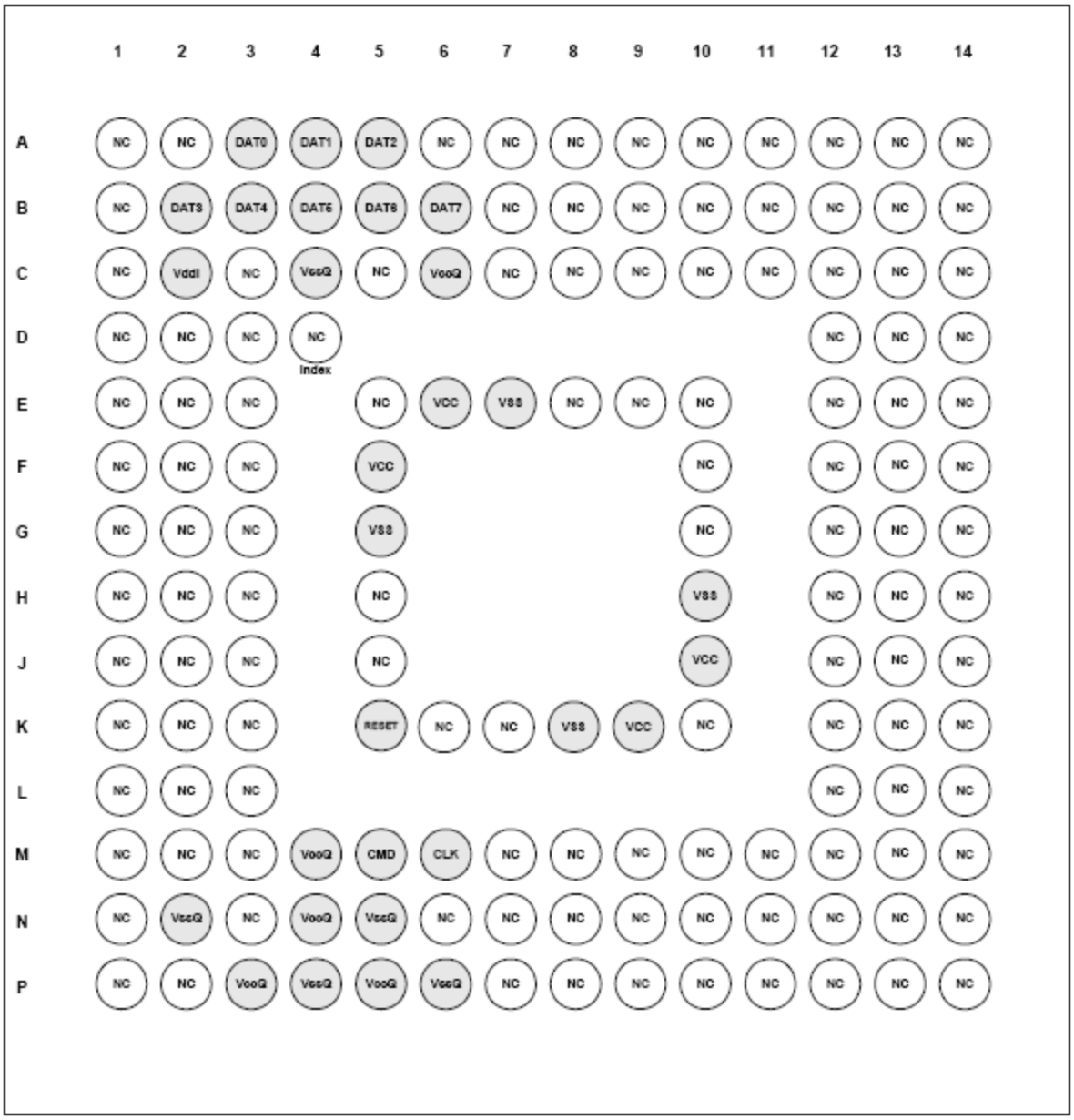
-H8MBX00U0MER-0EM

4G LPDDR POP



-iNAND e.MMC 2G

AP Memory



9. PCB LAYOUT

CN904 : Upper FPCB Conn1.
- no Power on
- no USB
- no Reseiver

CN803 : WiFi/Bluetooth antenna
- no WiFi/Bluetooth

CN801 : GPS Ant. Conn.
- no GPS

CN602 : 5M Camera Conn.
- no 5M camera

X101 : 26Mhz X-tal
- no Service

U601 : Camera PMIC
- no 8M Camera
- no 1.3M Camera

U504 : Motor D-IC
- no vibration

U701 : LCD Backlight charge pump
- no display

U101 : Transceiver
- no Service
- RF Sensitivity & TX Power

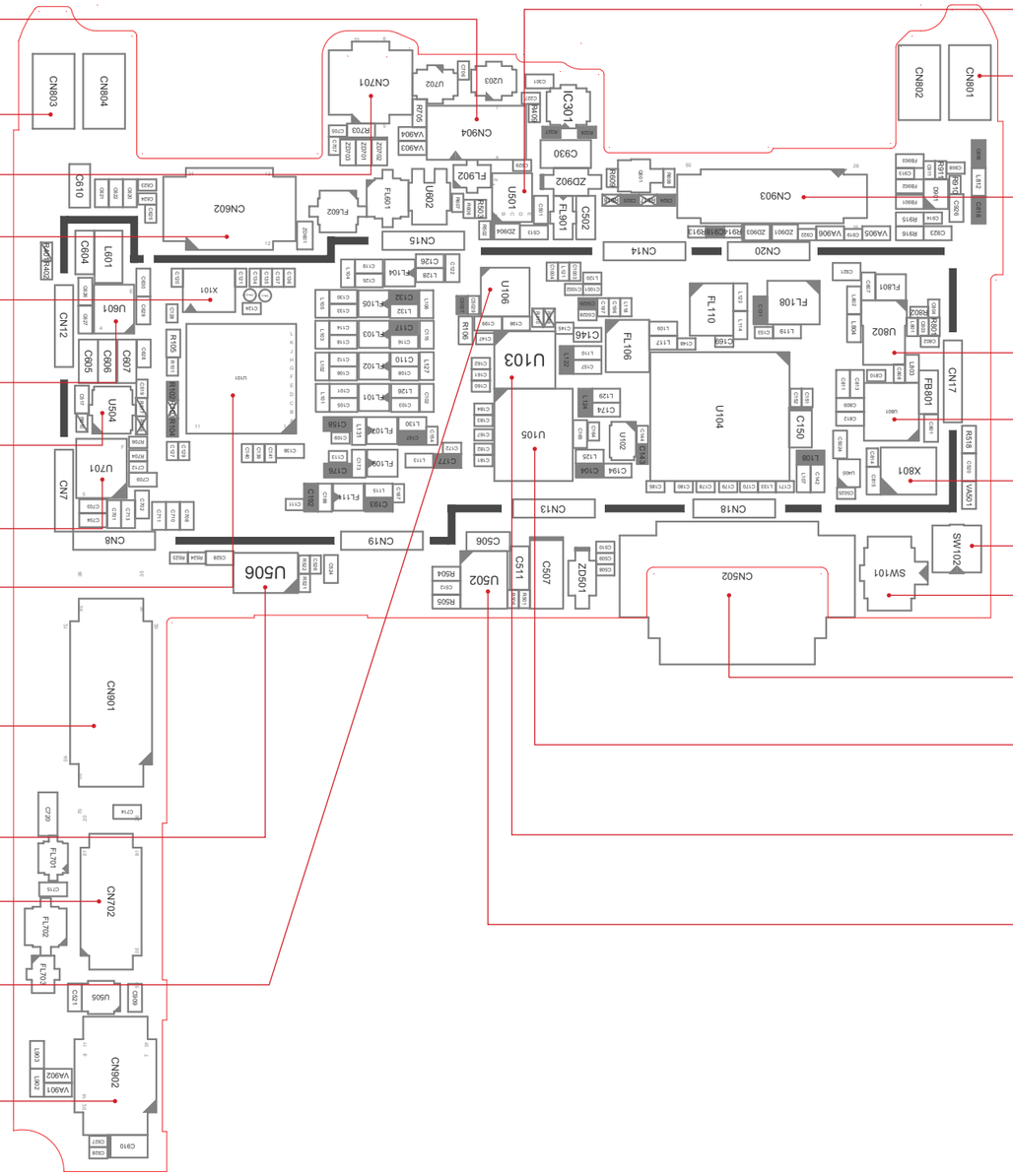
CN901 : Sub FPCB Conn.
-no SIM
-no T-flash memory
-no Flash LED
-no motion,Gyro,compass
-no volume

U506 : Fuel gauge
- Battery Bar accuracy declined

CN702 : LCD Conn.
- no display

U106 : LNA.
- no WCDMA service
- no RF sensitivity

CN902 : Lower Conn.
- no LED
- no MIC
- no speaker
- no Vibrator



U501 : MUIC
- no USB/UART

CN801 : GPS Ant. Conn.
- no GPS

CN903 : Upper FPCB Conn2.
- no Ear-jack
- no illumination sensor
- no proximity sensor
- no FM radio
- no VT cam
- no 2nd mic

U104 : FEM & GSM PAM
- no Service
- RF Sensitivity & TX Power

U801 : GPS chip
- no GPS

X801 : 26Mhz X-tal
- no GPS

SW102 : RF S/W
- no Service

SW101 : Coaxial Conn.
- no Service

CN502 : Battery Conn.
- no power On

U105 : PAM(Band1/8)
- no Service
- RF Sensitivity & TX Power

U103 : PAM(Band2)
- no Service
- RF Sensitivity & TX Power

U502 : Charger IC
- no charging

LG-P970_MAIN_EAX63969101_1.0_TOP

X802 : 38.4Mhz X-tal
- no WiFi connection
- no BT Connection
- no FM Radio

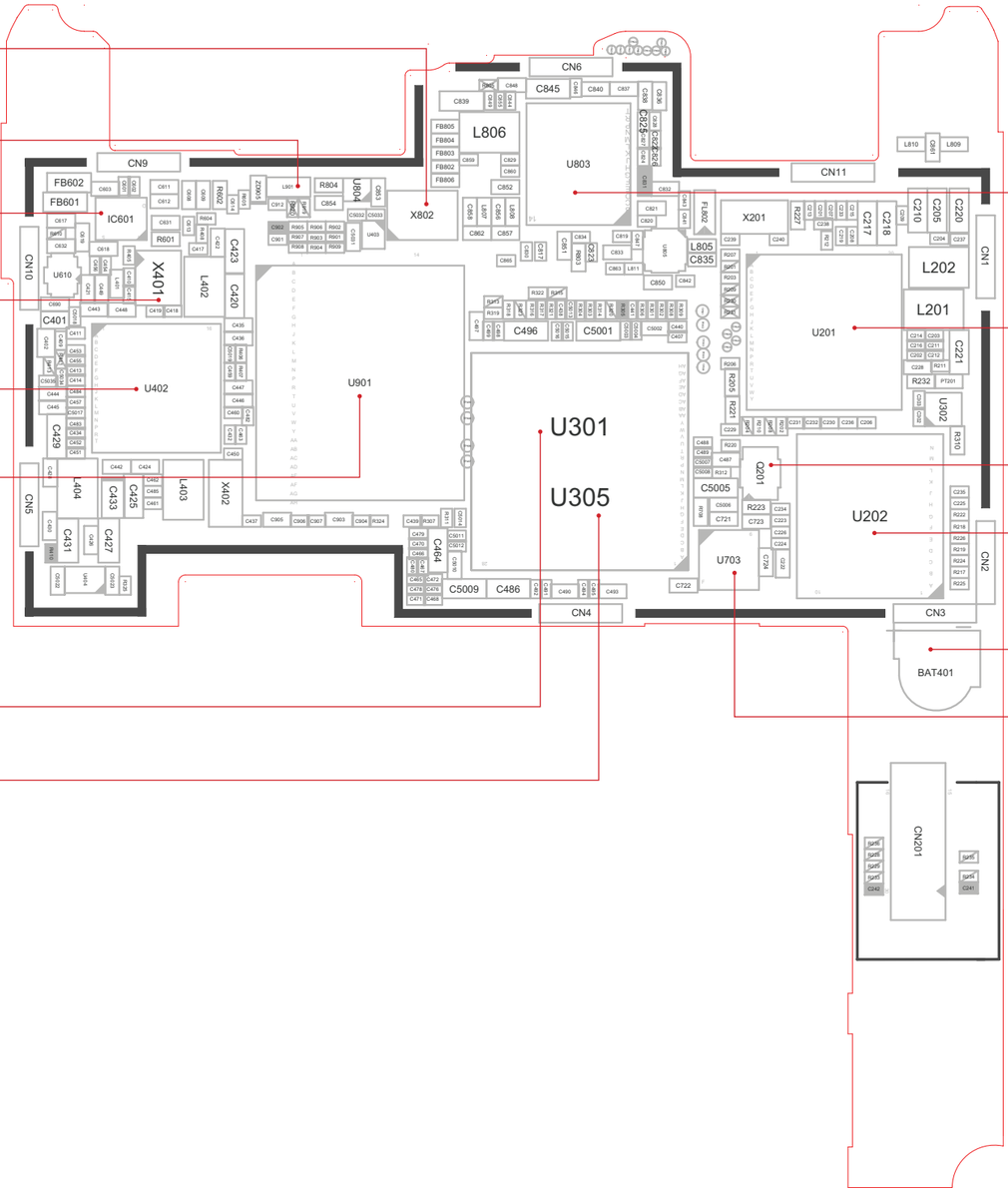
U403 : EAR LDO
- no Ear-mic

IC601 : Audio system
- no sound

X401 : 26Mhz X-tal
- no Power On
- no Booting

U402 : PMIC
- no Booting
- no Power On
- no Service

X401 : 26Mhz X-tal
- no Power On
- no Booting



U1203 : WiFi+BT+FM Radio Module
- no WiFi connection
- no BT Connection
- no FM Radio

U201 : CP modem
- no service

Q201 : FET
- no CP USB

U202 : CP memory
- no service

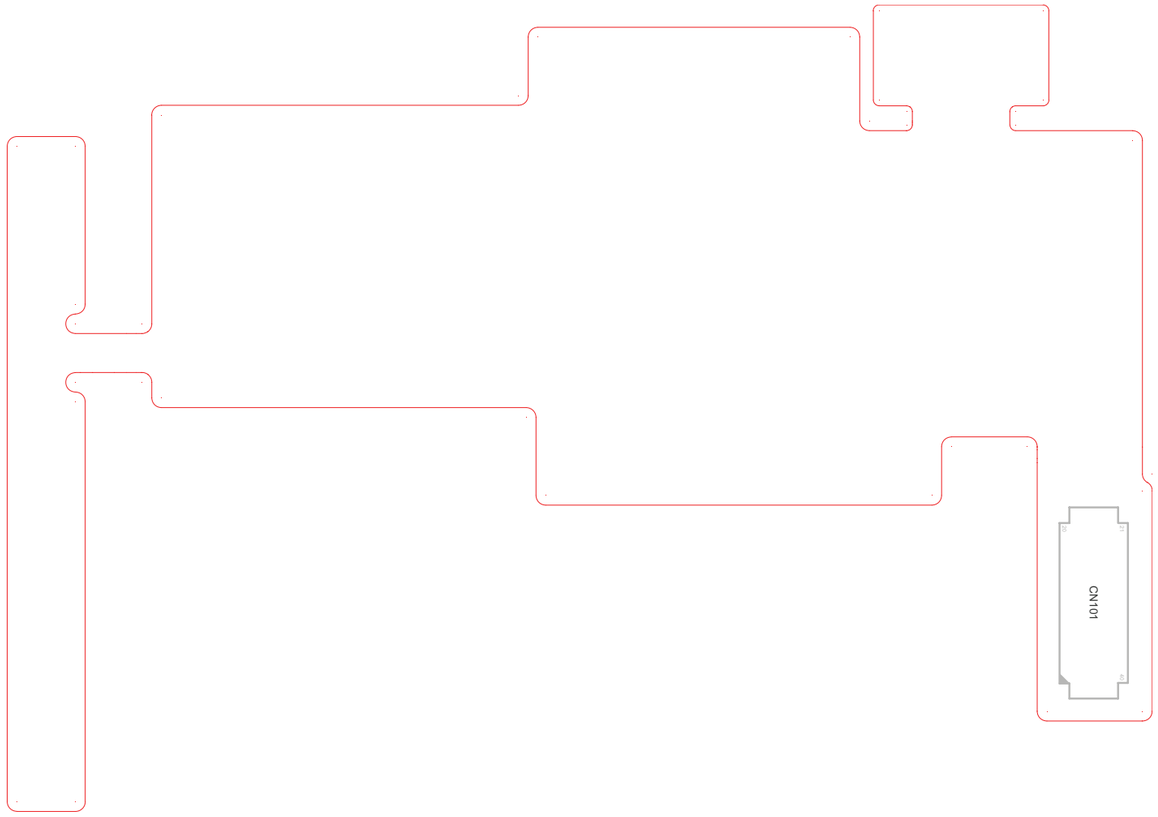
M601 : BackupCap.
- RTC Reset

U703 : RGB LED D-IC
- no Key LED

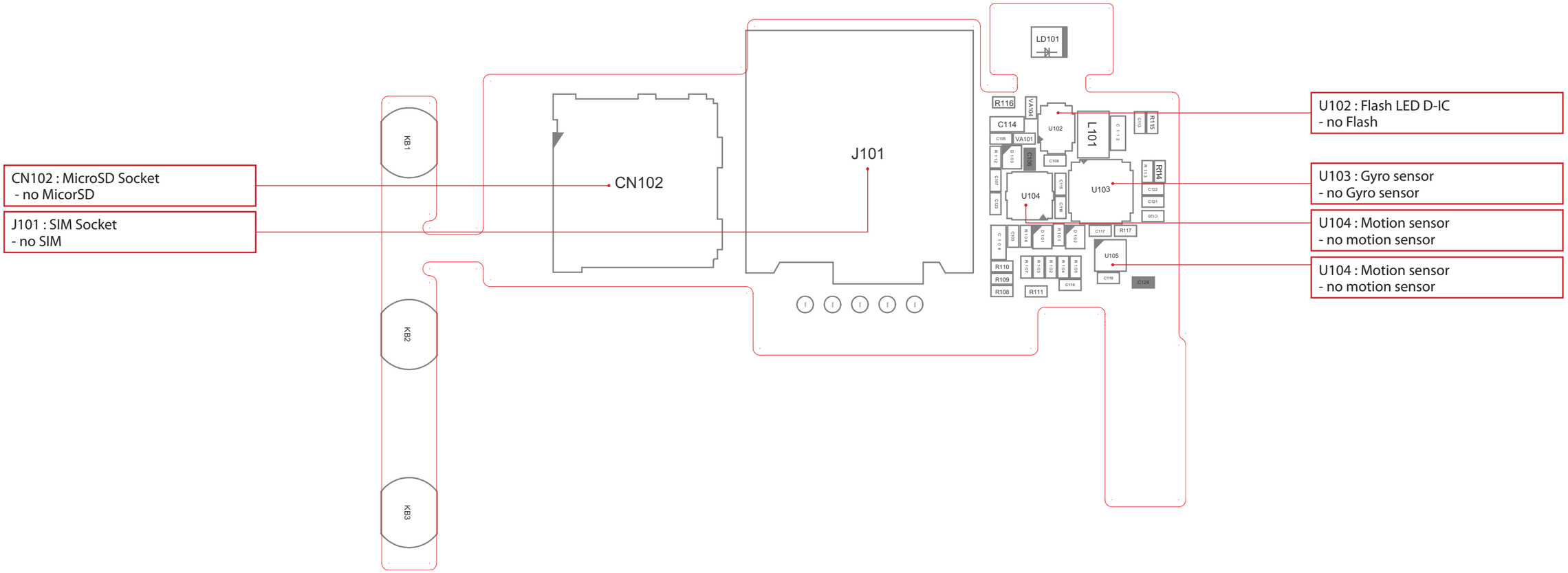
U301 : POP memory(Top)
- no booting

U305 : DBB(Bottom)
- no booting
- no Power On
- no Servive

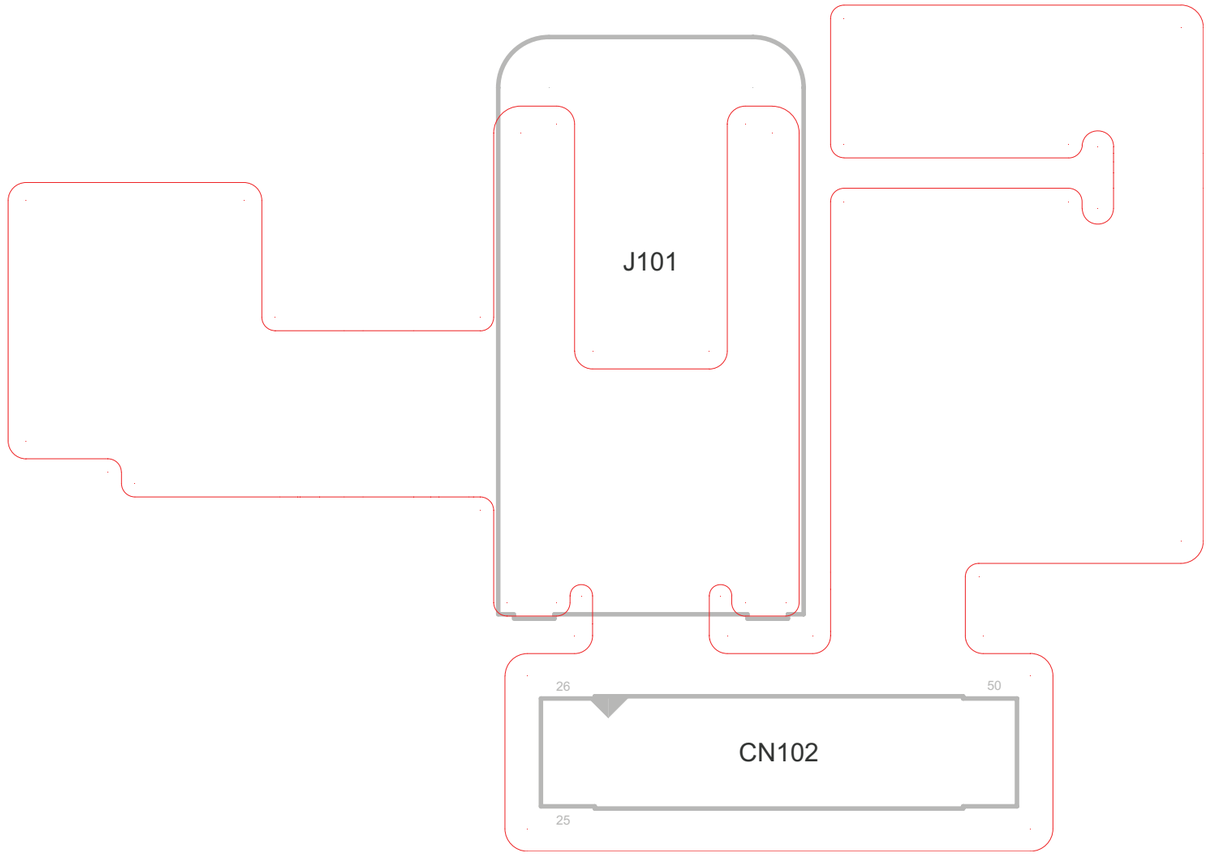
LG-P970_MAIN_EAX63969101_1.0_BOT



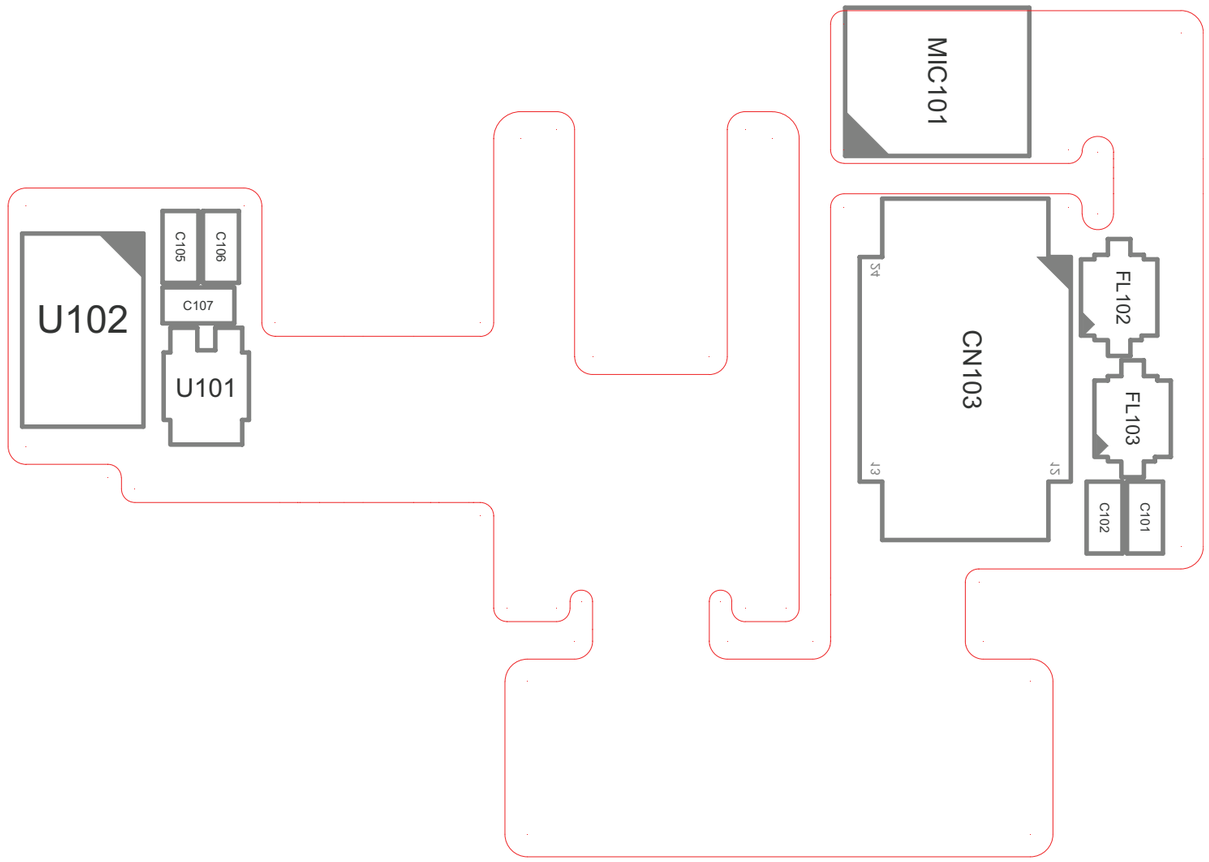
LG-P970_SUB_EAX63990501_1.0_TOP



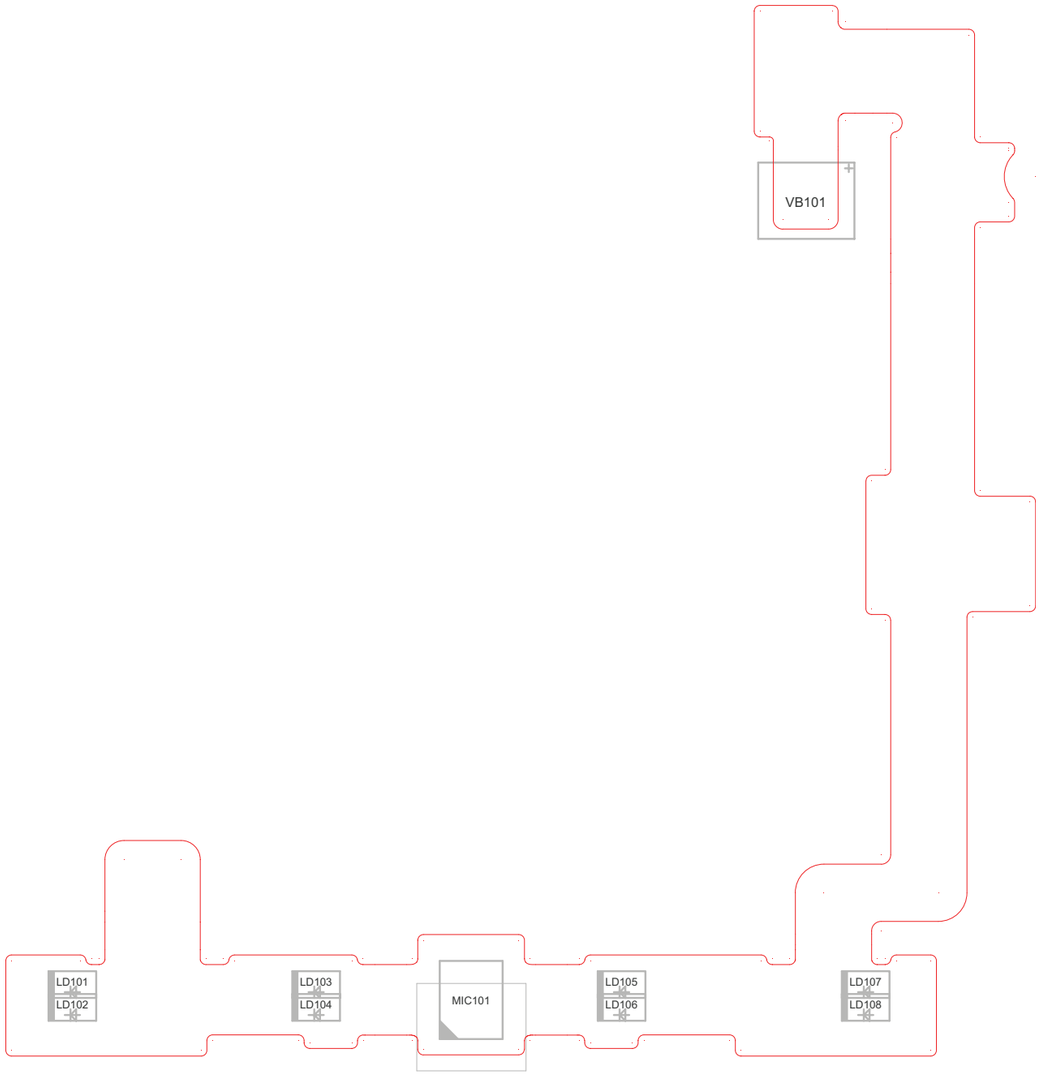
LG-P970_SUB_EAX63990501_1.0_BOT



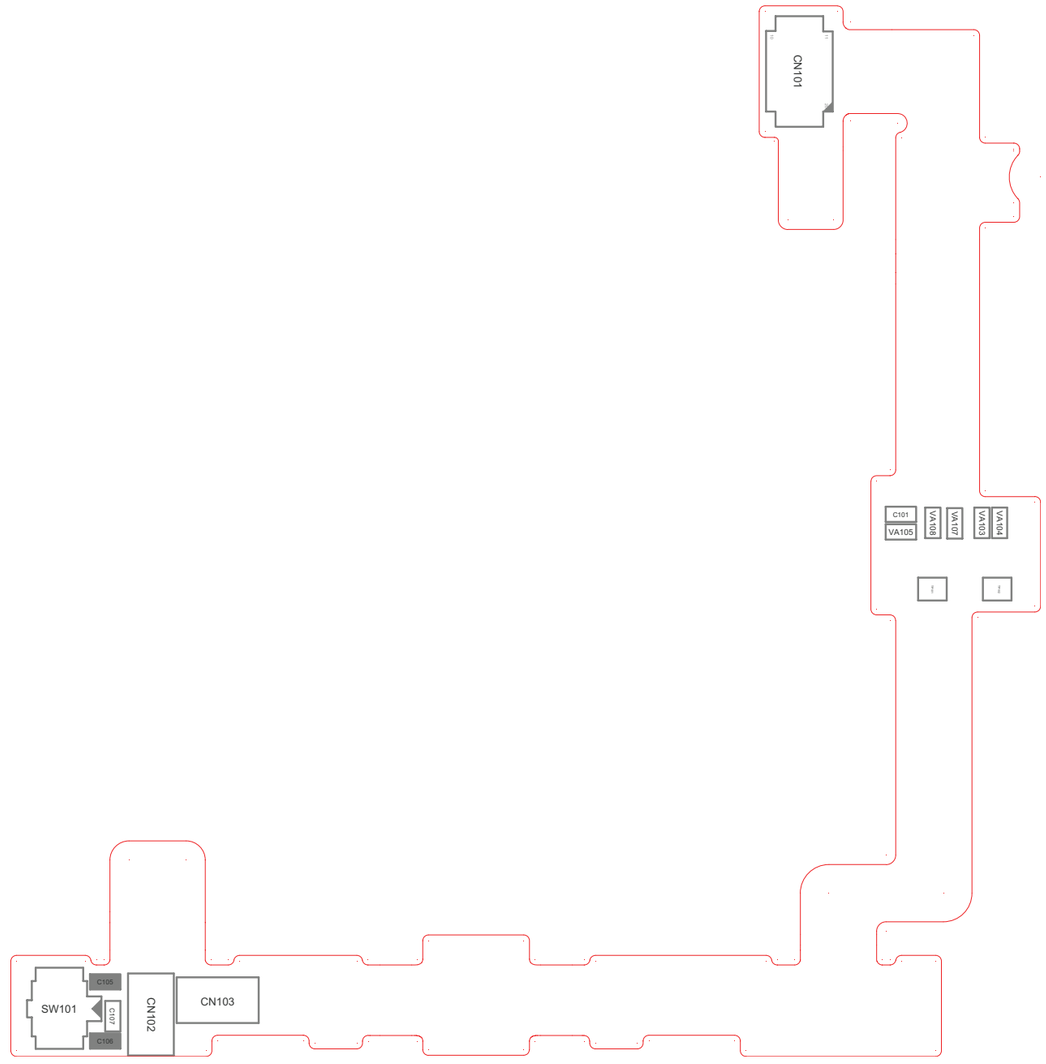
LG-P970_F_VT_CAM_1.0_TOP



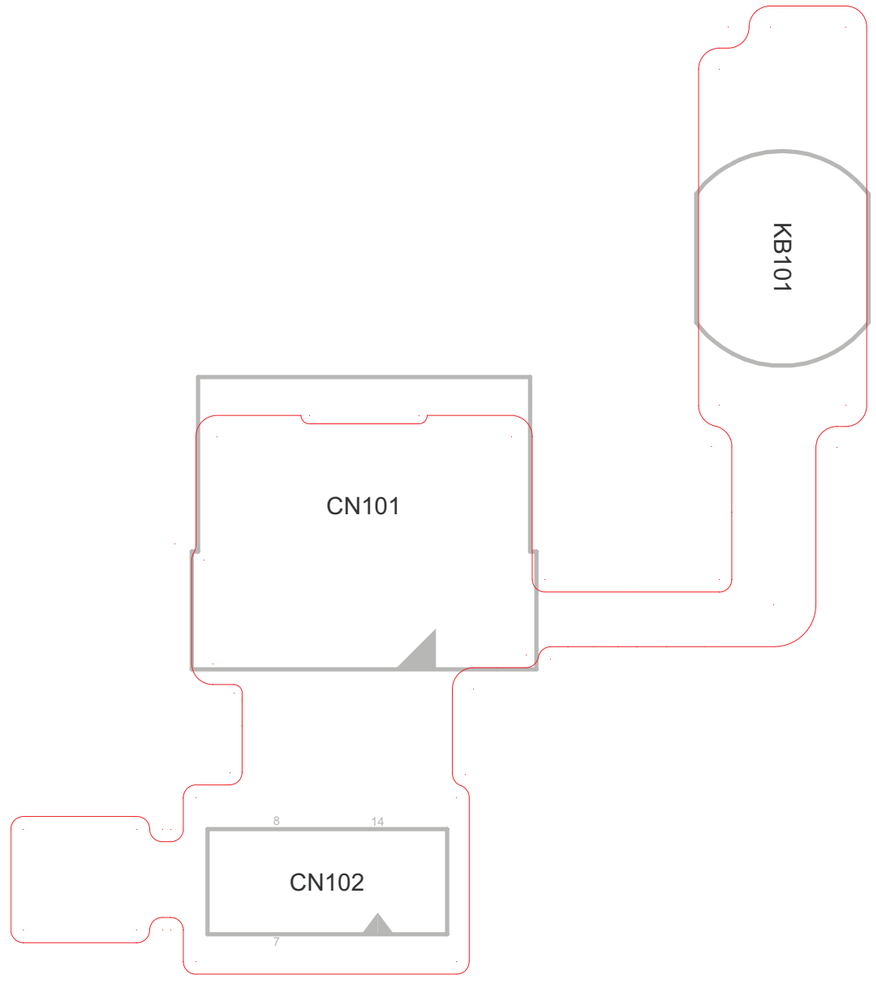
LG-P970_F_VT_CAM_1.0_BOT



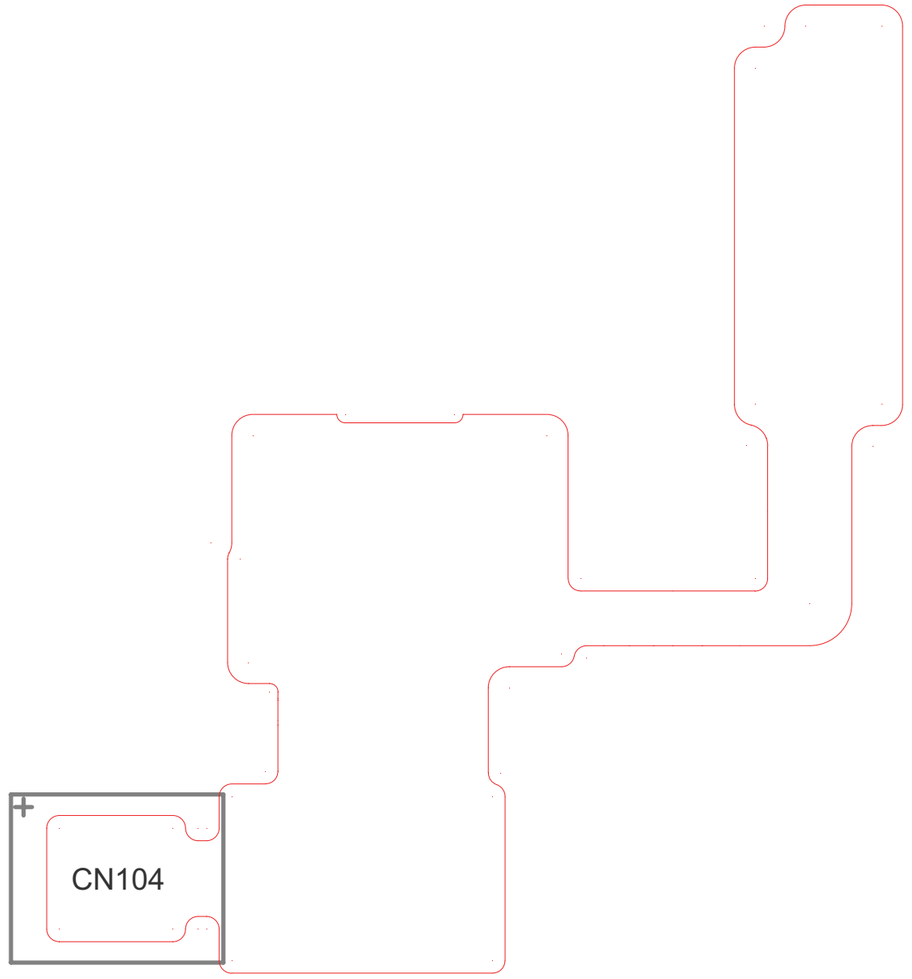
LG-P970_F_ANT_EAX63991001_1.0_TOP



LG-P970_F_ANT_EAX63991001_1.0_BOT



LG-P970_F_USB_1.0_TOP



LG-P970_F_USB_1.0_BOT

10. CALIBRATION

10.1 General Description

This document describes how to install and use the RF calibration software (Tachyon) of LG 3G mobile phone with Infineon Chipsets.

10.2 Requirement

Requirements for RF calibration of LGE mobile phone are outlined in the following sections.

10.2.1 Hardware

Desktop or laptop computer

Agilent 8960 Series 10 (E5515C) Testset

GPIB card and cable for communicating with Agilent 8960 Series 10 Testset

Power Supply, or 4V battery, and power cable for putting power on the mobile phone.

Data(USB or UART) cables for connecting the mobile phone to computer's serial port

RF cable

10.2.2 driver

National Instruments GPIB & VISA driver

LGE mobile USB driver

Data cable driver(optional)

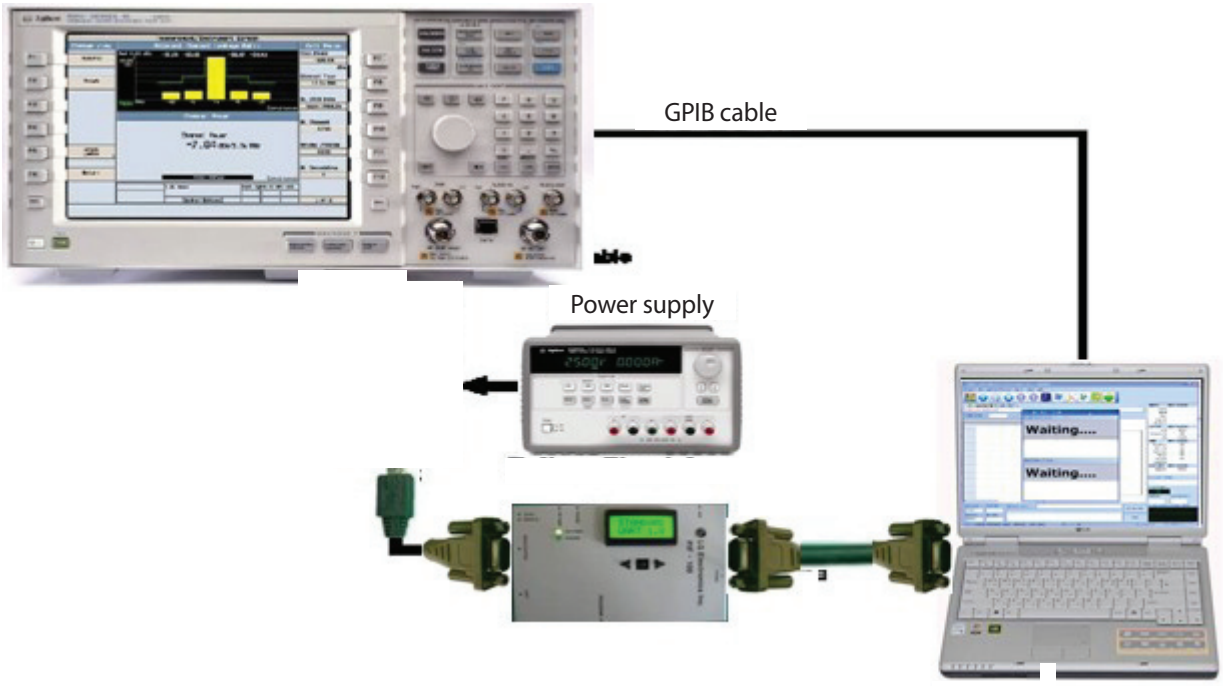
10.2.3 System

Windows XP SP2 or better

RAM 512M or grater

HDD 1GB of available space

10.3 Setup for RF calibration



10.4 Tachyon Software Installation

1) Install Tachyon_setup_Eng_xxxxxxxx.exe to C:/LGE/Tachyon directory.

2) Unzip Tachyon_Release_xxxxxxxx.zip, and overwrite all files to the same path.

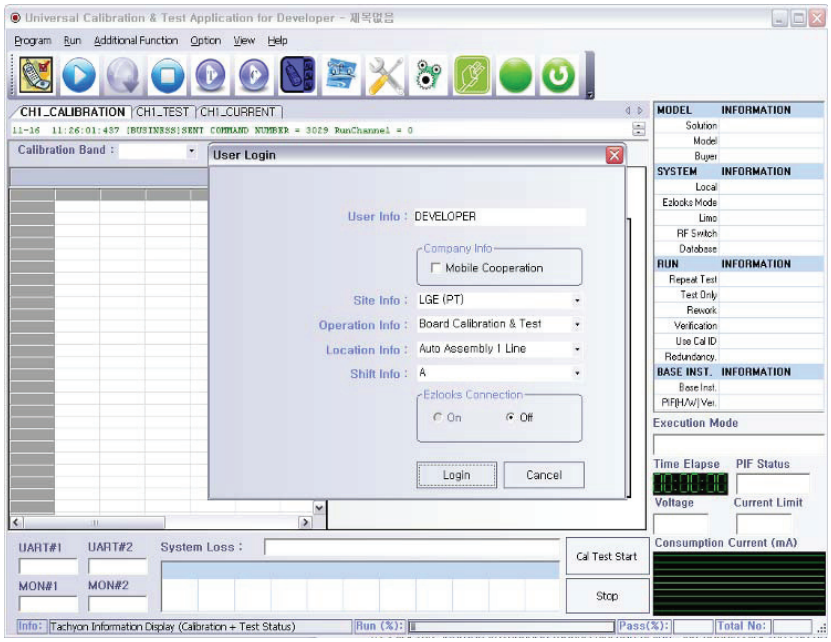
3) Install OCX_Registration.bat for registering Tachyon Components in C:/LGE/Tachyon/OCX/ directory.

10.5 Tachyon Usage

After hardware setup is completed successfully and Tachyon program is installed ordinarily, RF calibration or Auto Test can be start in the following procedure.

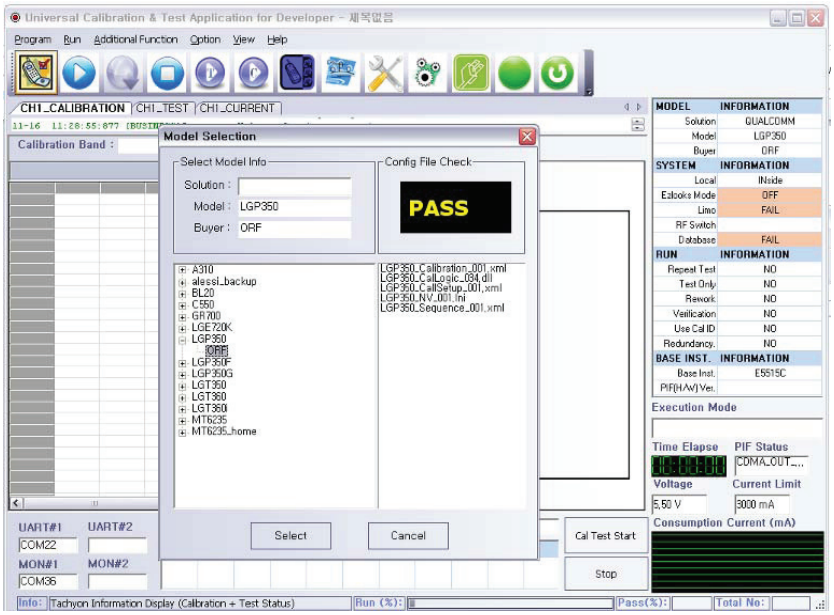
1)Execute Tachyon.exe in C:/LGE/Tachyon directory.

2)Click login button in the following login dialog window.

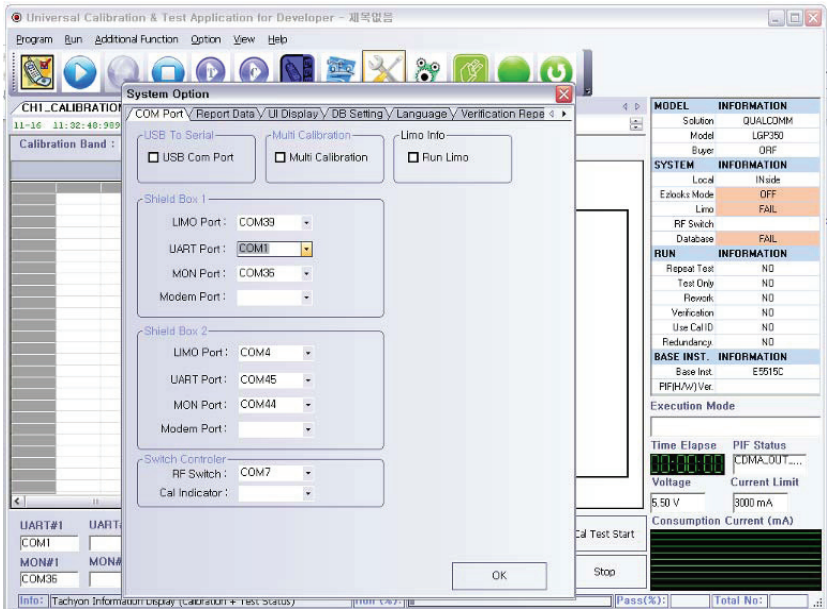


3)Click “model selection” button in toolbar for selecting the appropriate model.

4)Double click the right model - P970/ORF - in model tree, and then click ”select” button.

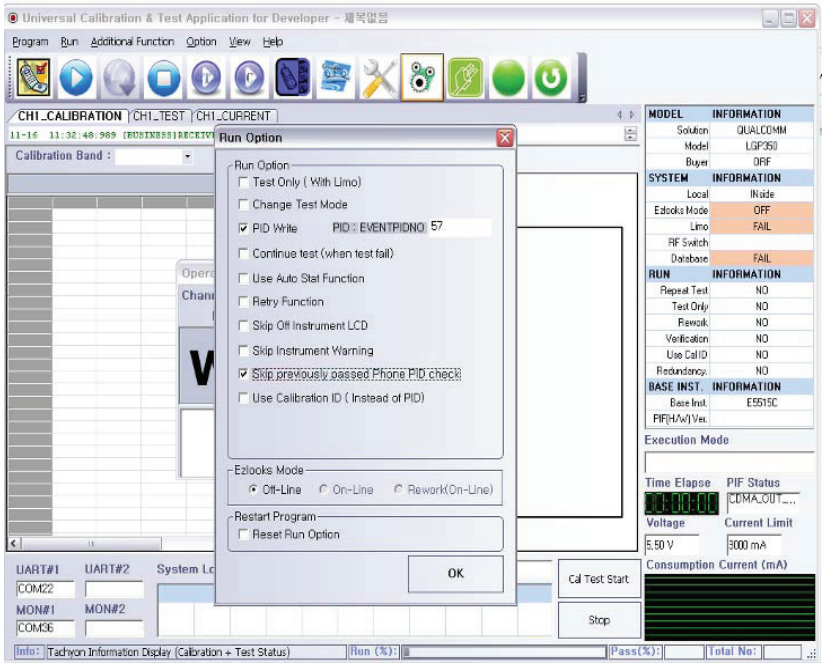


5)Click “system option” button in toolbar to connect the mobile phone to the Tachyon.



6)Click “run option” button in toolbar for passing over LGE factory setting.

7)Check “PID write” and “Skip previously Phone PID check”



8)Execute Hecaton.exe for setting RF cable loss to Agilent 8960. If not, Tachyon can't run.

9)Click "Calibration+Auto Test" button in Toolbar. Now RF calibration and autotest will start.

For more information, refer to the manual in C:/LGE/Tachyon/Manual folder.

10.6 Overview of RF Calibration

10.6.1 Supported entry of RF Calibration

As using PMB5803, P970 adopts some of calibrations in those of PMB5803. This is also supporting Quad band WCDMA and Quad band GSM. Table 1-1 and Table 1-2 describes the information listed for RF calibration items used by P970.

Calibration	WCDMA 2100	WCDMA 1900	WCDMA 900	WCDMA 850	description
Tx Sweep Calibration	○	○	○	○	Tx output power measurements
Tx Hdet Calibration	○	○	○	○	HDET ADC measurements vs Tx power
Tx Comp vs Freq Calibration	○	○	○	○	16-channel Tx output measurements in a certain PDM
Tx Secondary Comp vs Freq Calibration	X	X	X	X	Irregular Tx power measurements in a certain PDM
Tx Lim vs Freq Calibration	○	○	○	○	HDET ADC measurements in the Target Power
Rx DVGA Gain Offset Calibration	○	○	○	○	Rx DVGA gain measurements
Rx DVGA Gain Offset vs Freq Calibration	○	○	○	○	16-channel RX DVGA gain measurements
Rx LNA Range Offset Calibration	○	○	○	○	LNA gain offset measurements
Rx LNA Range Offset vs Freq Calibration	○	○	○	○	16-channel LNA gain offset measurements

Table 1-1. The calibration list for WCDMA

Calibration	GSM900	GSM850	GSM1800	GSM1900	description
VCO Calibration	○	X	X	X	Lowest frequency error- VCO measurement
Thermistor Calibration	X	X	X	X	Thermistor max/min ADC measurement
Tx External Polar Calibration	○	○	○	○	Tx output power measurements
Polar path delay Calibration	X	X	X	X	PM and AM signal path delay
Carrier Suppression Calibration	X	X	X	X	carrier power measurement
Rx Gain Range Calibration	○	○	○	○	8 or 16 channel Rx Gain measurements

For more information, refer to “XMM6180_RF_parametrical_structure.pdf”.

Table 1-2. The calibration list for GSM

10.6.2 Feature of RF calibration

Tachyon configuration is describes in this section. The information indicates the state of the mobile phones will become a factor.

[1] WCDMA band

Table 1-3 describes the calibration feature of WCDMA band.

Item		Sub Item	WCDMA 2100	WCDMA 900
Calibration Channel		Tx	9883	2863
		Rx	10833	3088
Tx Target Power(dBm)			22.5	22.5
PAM gain switching(dBm)		High to low gain	11.0	11.0
		Low to high gain	14.0	14.0
High Gain Mode	Calibrated PDM Range	Max	222	227
		Min	160	134
	PDM step		2	3
	Measured data of 32 array		26	25
	Threshold of Power Range(dBm)	≥ Up threshold	25.0	25.0
		≤ Low threshold	6.0	6.0
Low Gain Mode	Calibrated PDM Range	Max	235	255
		Min	80	69
	PDM step		5	6
	Measured data of 32 array		27	26
	Threshold of Power Range(dBm)	≥ Up threshold	15.0	16.0
		≤ Low threshold	-55.0	-53.0
Allowable power range in HDET range(dBm)		≥ Lower limit	16.5	16.5
		≤ Upper limit	24.5	24.5
Allowable HDET adc range		≥ Lower limit	50	80
		≤ Upper limit	160	175
DVGA Calibration Power(dBm)			-74.0	-74.0
DVGA Calibration Range		≥ Lower limit	130	80
		≤ Upper limit	300	300
LNA Calibration Power(dBm)		Range 0-1	-66.0	-68.0
		Range 1-2	-42.0	-50.0
		Range 2-3	-26.0	-38.0
		Range 3-4	X	-26.0

Table 1-3. Feature of Tx/Rx calibration in WCDMA 2100/900 band

[2] Quad GSM band

Table 1-4 describes the calibration feature of Quad GSM bands.

Item	Sub item	GSM 900	GSM 850	GSM 1800	GSM 1900
Tx Calibration channel	F1	975	128	512	512
	F2	124	251	885	810
Power range in AMAM/AMPM NVs (dBm)	Max	34.0	34.0	31.0	31.0
	Min	-20.0	-20.0	-20.0	-20.0
Rx Gain Range Calibration Power (dBm)	Range 0	-80	-80	-80	-80
	Range 1	-80	-80	-80	-80
	Range 2	-50	-50	-50	-50
	Range 3	-50	-50	-50	-50
	Range 4	-50	-50	-50	-50
Rx Gain Range Calibration Range (Lower limit/Upper limit)	Range 0	1900/2500	1900/2500	1900/2500	1900/2500
	Range 1	1200/2300	1200/2300	1200/2300	1200/2300
	Range 2	1300/1900	1300/1900	1300/1900	1300/1900
	Range 3	1200/1800	1200/1800	1200/1800	1200/1800
	Range 4	1100/1700	1100/1700	1100/1700	1100/1700
Tx External Polar calibration PDM table	13025,1900,1950,2000,2050,2100,2150,2200,2250,2300,2350,2400,2450,2500,2550,2600,2650,2700,2750,2800,2850,2900,2950,3000,3075,3150,3225,3300,3375,3450,3525,3600,3675,3750,3825,3900,3975,4050,4125,4200,4275,4350,4425,4500,4575,4650,4725,4800,4875,4950,5025,5100,5175,5250,5325,5400,5475,5550,5625,5700,5775,5850,5925,6025,6125,6225,6325,6425,6525,6625,6725,6825,6925,7025,7125,7225,7325,7425,7525,7625,7725,7825,7925,8025,8125,8225,8325,8425,8525,8625,8725,8825,8925,9025,9125,9225,9325,9425,9525,9625,9725,9825,9925,10025,10125,10225,10325,10425,10525,10625,10725,10825,10925,11025,11125,11225,11375,11525,11675,11825,11975,12125,12275,12425,12575,12725,12875,13025,13175,13325,13475,13625,13775,13925,14075,14225,14375,14525,14675,14825,14975,15125,15275,15425,15575,15725,15875,16025,16175,16300				

Table 1-4. Feature of Tx/Rx calibration in Quad GSM band

[3] Channels of RF Calibration

W2100 Tx	9621	9638	9656	9673	9691	9708	9726	9743	9761	9778	9796	9813	9831	9848	9866	9883
W2100 Rx	10571	10588	10606	10623	10641	10658	10676	10693	10711	10728	10746	10763	10781	10798	10816	10833
W900 Tx	2712	2722	2733	2743	2754	2765	2776	2787	2796	2806	2815	2825	2834	2844	2853	2863
W900 Rx	2937	2947	2958	2968	2979	2990	3001	3012	3021	3031	3040	3050	3059	3069	3078	3088

Table 1-5 Channel of WCDMA

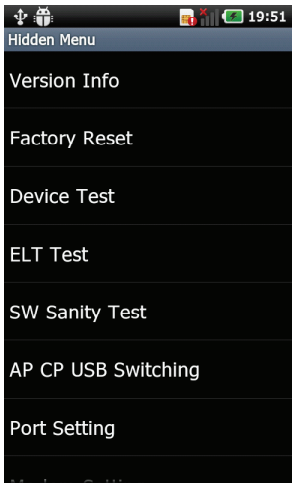
GSM850	128	145	163	180	198	215	233	251
GSM900	1	31	62	92	124	975	1000	1023

Table 1-5 Channel of GSM850/GSM900

GSM 1800	512	537	562	587	612	637	662	687	712	737	762	787	812	837	862	885
GSM 1900	512	532	552	572	592	612	632	652	672	692	712	732	752	772	792	810

Table 1-7 Channel of GSM/1800/GSM1900

11. HIDDEN MENU

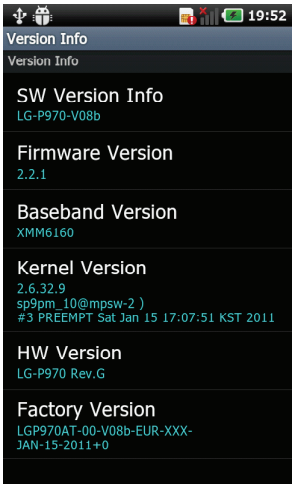


Hidden Menu Start

Start shortcut keys : 3845#*970#

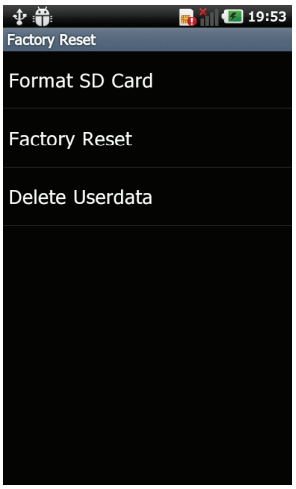
Hidden Menu List

Start the desired menu: Menu, click



Version Info

Classified Information representation

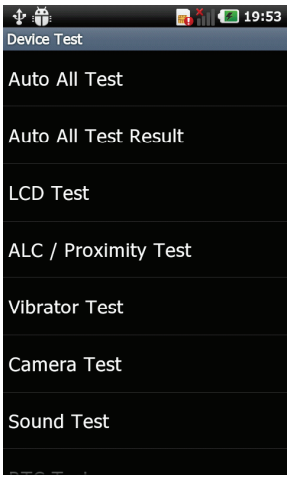


Factory Reset

Format SD card : External SD Card Data reset

Factory Rest : Changing the Factory

Delete Userdata : Delete Userdata



Device Test

List:

Auto all Test: Device functionality testing at the factory to use

Auto All Test Result

LCD Test

ALC / Proximity Test

Vibrator Test

Camera Test

Sound Test

RTC Test

Touch Test

External Memory Test

Key / Compass Test

Gesture Test

LED current control

LCD Backlight current control

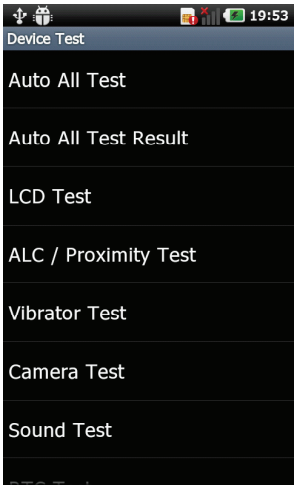
Accelerometer Test

Gyroscope Test

Gyro Cal Test

Hall Sensor Test

Reset SD Card

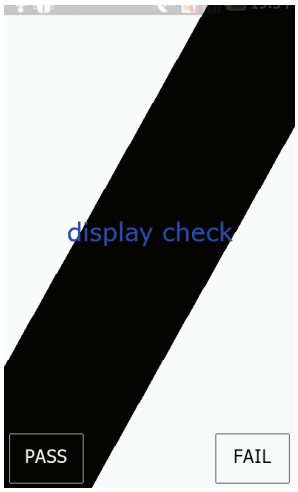


Device Test List

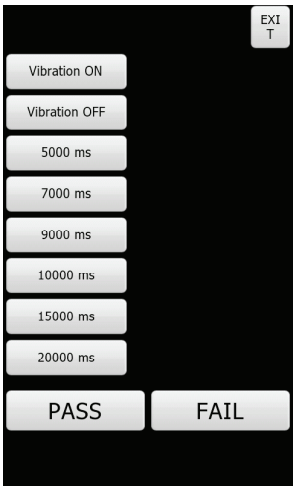
Auto All Test :

-> Auto All Test menu click

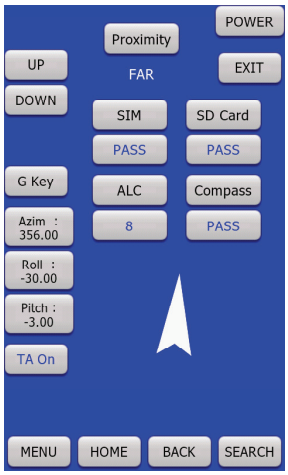
-> Continuous information on the menu, giving you ability test



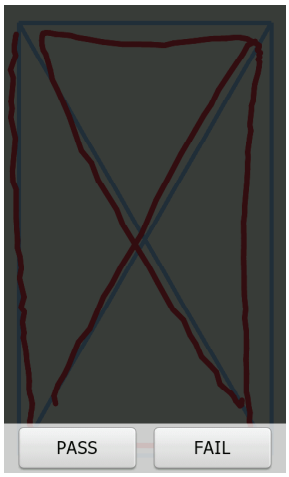
Display Check Test



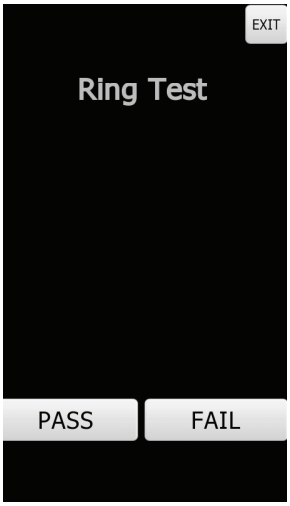
Vibrator Test



Key / SIM / SD Card / TA / Proximity / ALC / Compass



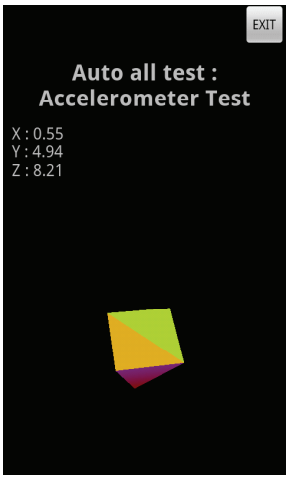
Touch Draw Test



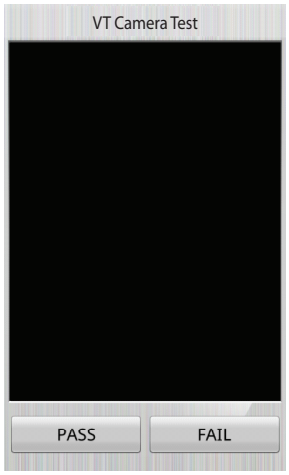
Ring Test

Camera Test_1
- Primary Camera

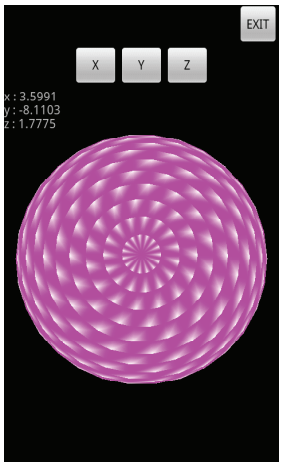
Camera Test_2
- Primary Camera



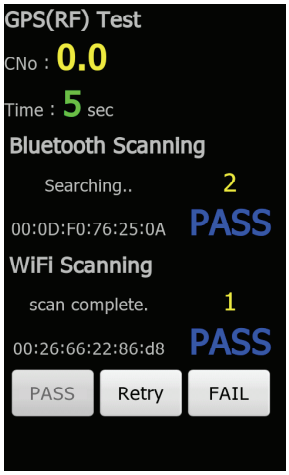
Accelerometer Test



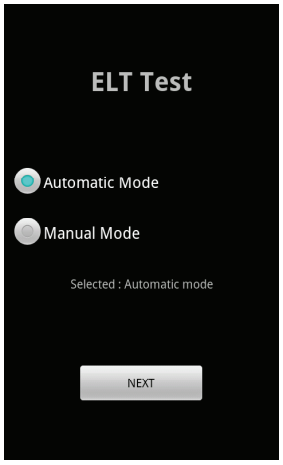
Camera Test_3
- Sencondary Camera



Gyroscope test



GPS / BT / WiFi



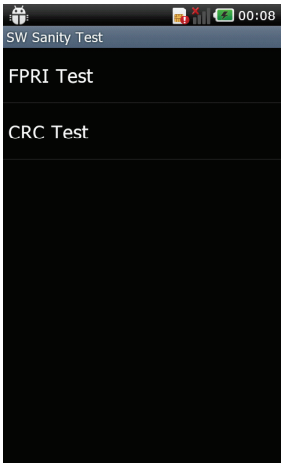
ELT Test
Automatic Mode : Test Automatically
Manual Mode : Test selectivity

ELT Test

Automatic Mode : LCD

Automatic on/off test

-> time setting



SW Sanity Test:

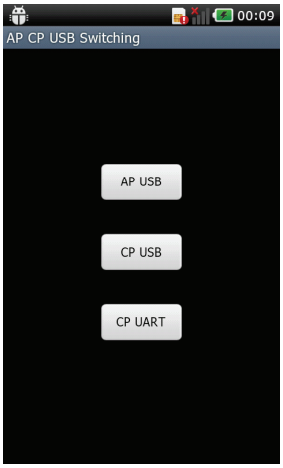
FPRI Test

CRC Test: 1. BIN CRC

2. CAL CRC

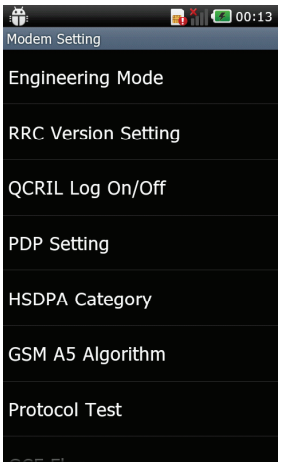
3. EFS CRC

Detail



AP CP USB Switching

Port Setting



Modem Setting

Menu:

Engineering Mode

RRC Version Setting

QCRIL Log On/Off

PDP Setting

HSDPA Category

GSM A5 Algorithm

Protocol Test

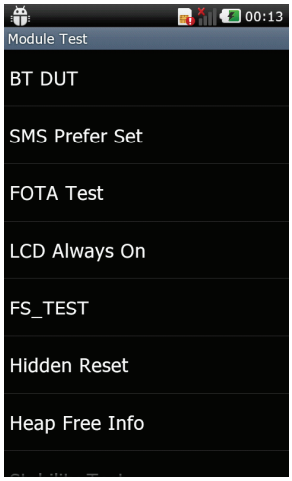
GCF Flag

Arm9 Log On/Off

Qos profiles

Preferred networks

CAL Backup / Restore



Module Test

List:

BT DUT setting

SMS Prefer Set

FOTA Test

LCD Always On

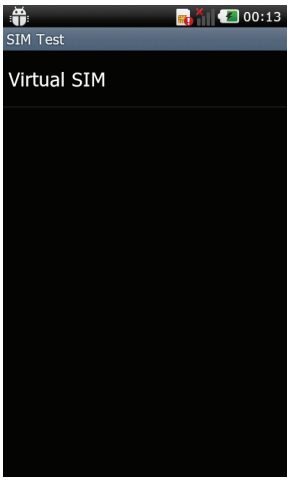
FS_TEST

Hidden Reset

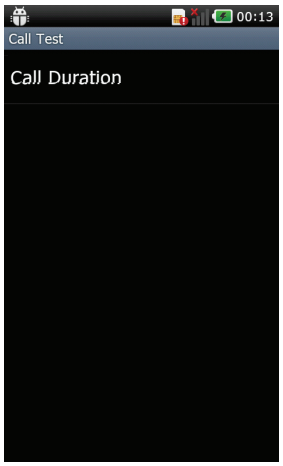
Heap Free Info

Stability Test

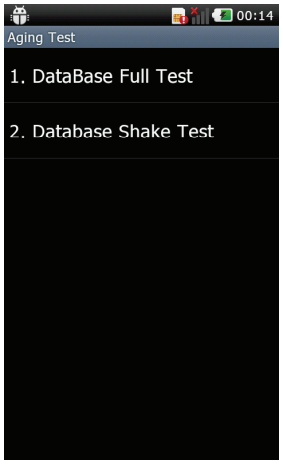
Charging Test



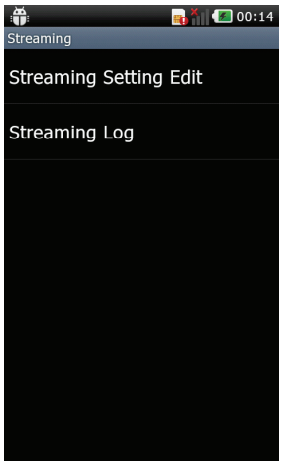
SIM Test



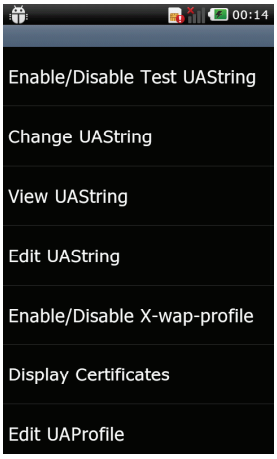
Call Test



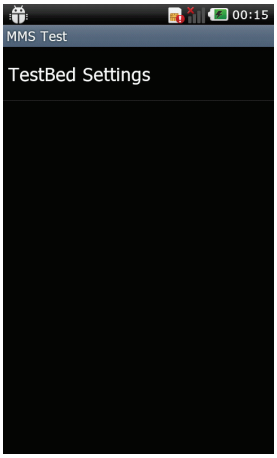
Aging Test



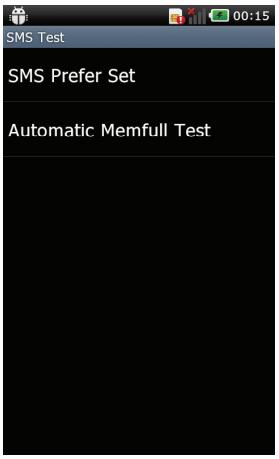
Streaming



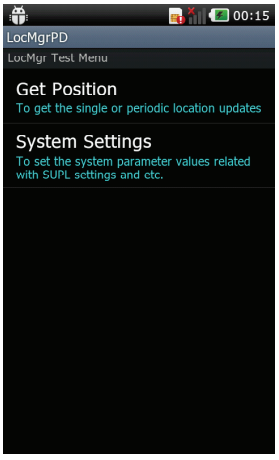
Browser Utility



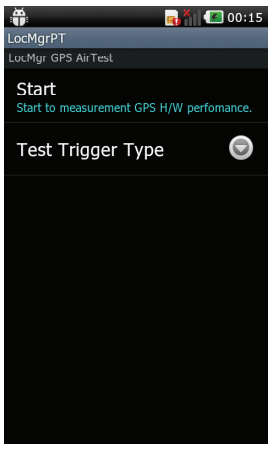
MMS Test



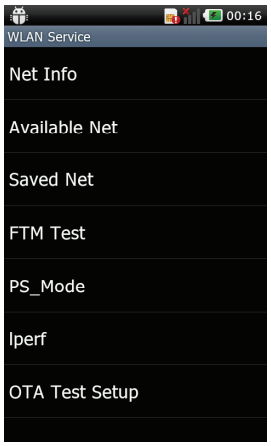
SMS Test



GPS Test

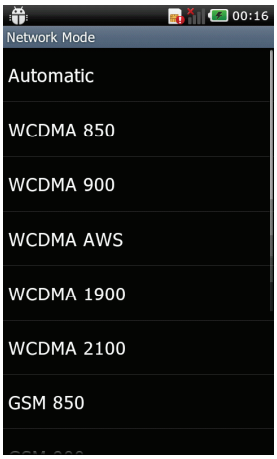


GPS Test_HW

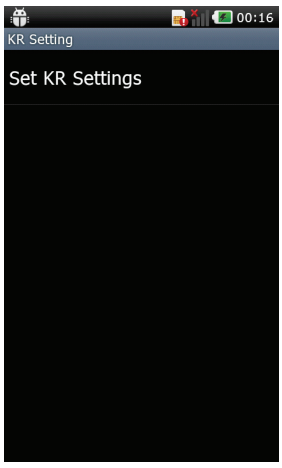


WLAN Test

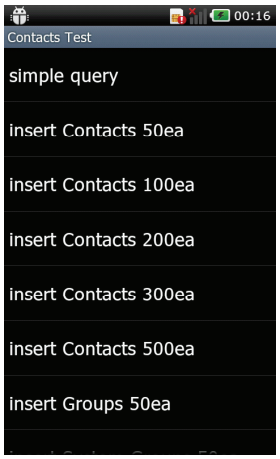
WLAN performance on SW



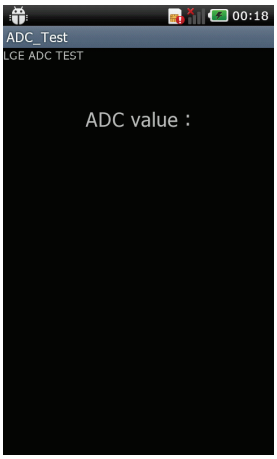
Network Mode



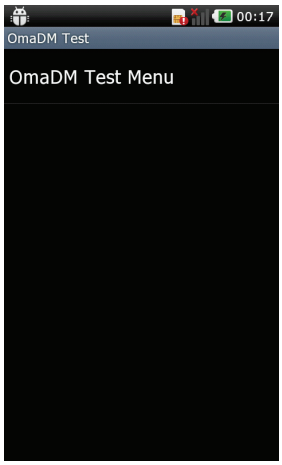
KR Setting



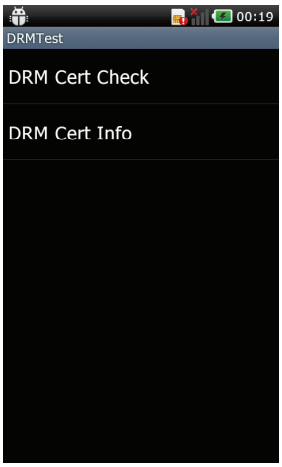
Contacts Test



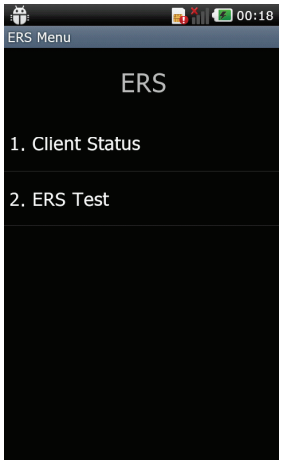
ADC Test



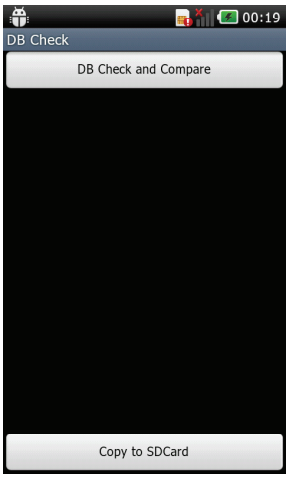
OmaDM Test



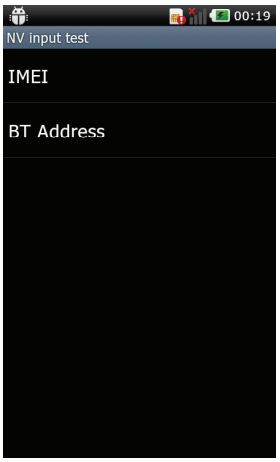
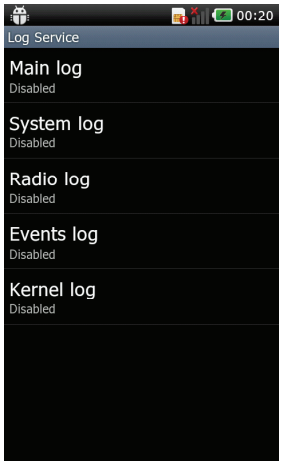
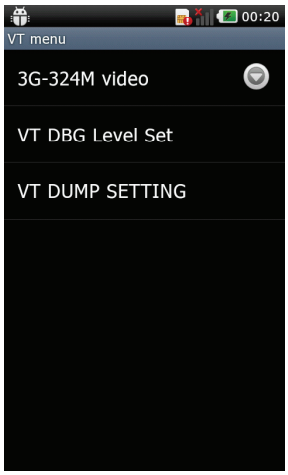
DRM Test



ERS Menu

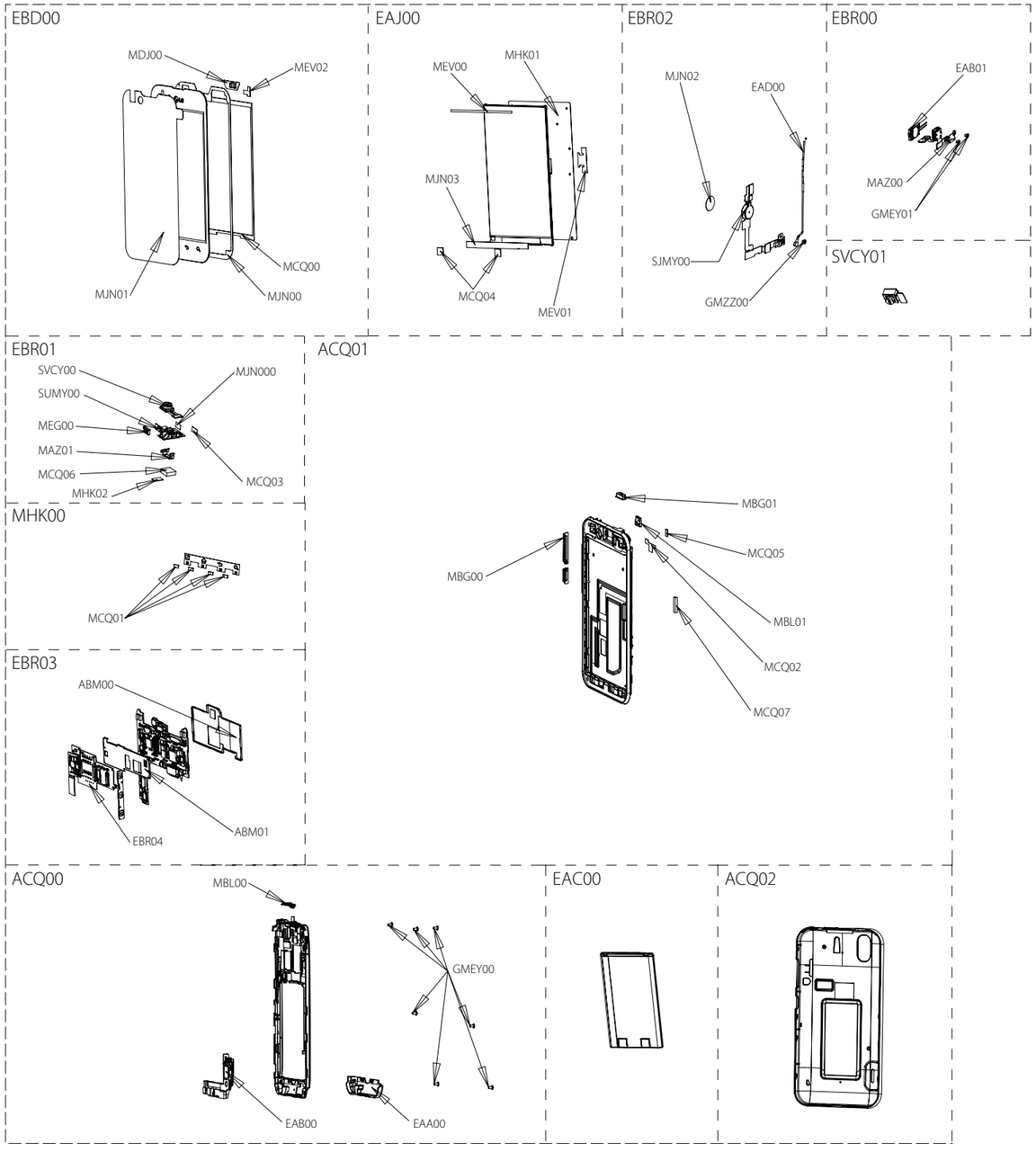


DB check

	**IMEI / BT address**
	**Log Service** Collect Log
	**VT Test**

12. EXPLODED VIEW & REPLACEMENT PART LIST

12.1 EXPLODED VIEW



Location	Description
ACQ00	Cover Assembly,Rear
MBL00	Cap,Receptacle
EAA00	PIFA Antenna,Multiple
EAB00	Speaker Module
SVCY00	Camera Module
SJMY00	Motor,DC
EBR00	PCB Assembly,Flexible
EBR01	PCB Assembly,Flexible
EBR02	PCB Assembly,Flexible
SUMY00	Microphone,Condenser
EBD00	Touch Window Assembly
EAJ00	LCD,Module-TFT
EAD00	Cable,Assembly
EAB01	Receiver
ACQ01	Cover Assembly,Front
MBG00	Button
MBG01	Button
MJN000	Tape
GMEY01	Screw,Machine
GMZZ00	Screw,Machine
MAZ00	Bracket
MAZ01	Bracket
MBL01	Cap
MCQ00	Damper,LCD
MCQ01	Damper
MCQ02	Damper
MCQ03	Damper
MCQ04	Damper,LCD
MCQ05	Damper
MCQ06	Damper
MCQ07	Damper,LCD
MDJ00	Filter
MEG00	Holder
MEV00	Insulator
MEV01	Insulator
MEV02	Insulator
MHK00	Sheet
MHK01	Sheet
MHK02	Sheet
MJN00	Tape,Window
MJN01	Tape,Window
MJN02	Tape
MJN03	Tape
EBR03	PCB Assembly,Main
ABM00	Can Assembly,Shield
ABM01	Can Assembly,Shield
SVCY01	Camera Module
EBR04	PCB Assembly,Flexible
GMEY00	Screw,Machine
ACQ02	Cover Assembly,Battery
EAC00	Rechargeable Battery,Lithium Ion

12.2 Replacement Parts <Mechanic component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
1	AGQ000000	Phone Assembly	AGQ86489825	LGP970.ADEUTL TL:Titanium Black -	
2	ACQ100400	Cover Assembly, EMS	ACQ85556326	LGP970.ADEUTL TL:Titanium Black -	
3	ACQ00	Cover Assembly, Rear	ACQ85429401	LGP970.ADEUZY ZZ:Without Color -	
4	MCQ015704	Damper, Connector	MCQ66564901	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MEZ000900	Label, After Service	MLAB0001102	COMPLEX C2000 CGRSV WA:White C2000 USASV DIA 4.0 PRINTING,	
4	MBL00	Cap, Receptacle	MBL64916901	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
4	MBL049500	Cap, Mobile Switch	MBL64901801	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
4	MCQ000001	Damper	MCQ66719801	COMPLEX LGP970.ADEUZY ZZ:Without Color 110304_sniper_damper_io_conn	
4	MCQ000000	Damper	MCQ66708001	CUTTING SR LGP970.ABYTTL ZZ:Without Color -	
4	EAA030101	PIFA Antenna, Multiple	EAA62505001	ACB-00105 DUAL -2DB 3:1 Planar Inverted F Type - MOBITECH CORPORATION	
4	EAA00	PIFA Antenna, Multiple	EAA62466301	HIL-02A82-0000AA MULTI -2DB 3:1 LDS Type - E.M.W CO., LTD.	
4	EAB00	Speaker Module	EAB62291101	SI-B-P Nd-Fe-B 700mW 8OHM 78DB 1.32KHZ 38.65*32.79*6.4 1810*3.0T module PIN BUJEON ELECTRONICS CO., LTD	
4	MCQ015702	Damper, Connector	MCQ66573301	CUTTING TR 30 LGKU5900.AKTFBK ZZ:Without Color -	
4	MCQ015701	Damper, Connector	MCQ66573401	CUTTING TR 30 LGKU5900.AKTFBK ZZ:Without Color -	
4	MCQ015703	Damper, Connector	MCQ66573501	CUTTING TR 30 LGKU5900.AKTFBK ZZ:Without Color -	
4	MCQ015700	Damper, Connector	MCQ66573601	CUTTING TR 30 LGKU5900.AKTFBK ZZ:Without Color -	

Level	Location No.	Description	PartNumber	Spec	Remark
4	MCQ009400	Damper, Camera	MCQ66584701	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MCR000000	Decor	MCR64426301	PRESS AL5052 0.3 LGP970.ADEUZY ZZ:Without Color -	
4	MFB029600	Lens, Flash	MFB62532901	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
4	MJN020800	Tape, Decor	MJN67746901	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MJN061100	Tape, Protect	MJN67751301	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MJN000000	Tape	MJN67756501	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MJN009400	Tape, Camera	MJN67767001	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MKC009400	Window, Camera	MKC63998801	CUTTING PMMA LGP970.ADEUZY ZZ:Without Color -	
4	MCK063300	Cover, Rear	MCK66685001	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
3	ACQ003400	Cover Assembly, Bar	ACQ85450201	LGP970.ADEUZY ZZ:Without Color -	
4	SVCY00	Camera Module	SVCY0023801	C2FA-H274A C2FA-H274T 2M FF, Hynix(1/5"), 7x7x4.1t, FPCB, 90degree LG INNOTEK CO., LTD	
4	SJMY00	Motor, DC	SJMY0007118	MVMF-A301F 2.0 V, 40 mA, 10*3.0, Q-Coin 12mm Wire, 3V, - LG INNOTEK CO., LTD	
4	EBR00	PCB Assembly, Flexible	EBR73418511	LGP970.ABYTTL 1.0 Flexible	
5	EBR070100	PCB Assembly, Flexible, Insert	EBR73707601	LGP970.ABYTTL 1.0 Flexible	
5	EBR070400	PCB Assembly, Flexible, SMT	EBR73418602	LGP970.ADEUZY 1.0 Flexible	
6	EAX010700	PCB, Flexible	EAX63990901	LGP970.ADEUZY 1.2 POLYI Multi 3 0.33 Flexible	
6	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73418702	LGP970.ADEUZY 1.0 Flexible	

Level	Location No.	Description	PartNumber	Spec	Remark
6	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73418902	LGP970.ADEUZY 1.0 Flexible	
4	EBR01	PCB Assembly, Flexible	EBR73418510	LGP970.ABYTTL 1.0 Flexible	
5	EBR070400	PCB Assembly, Flexible, SMT	EBR73418603	LGP970.ADEUZY 1.0 Flexible	
6	EAX010700	PCB, Flexible	EAX64107901	LGP970.ADEUZY 1.0 POLYI SBL 4 0.33 Flexible	
6	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73418703	LGP970.ADEUZY 1.0 Flexible	
7	MIC101	Microphone, Condenser	SUMY0010609	SPU0410HR5H -PB SPU0410HR5H -PB, UNIT, 42 dB, 3.76*2.95*1.1, mems smd mic KNOWLES ACOUSTICS	
6	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73418903	LGP970.ADEUZY 1.0 Flexible	
5	EBR070100	PCB Assembly, Flexible, Insert	EBR73496201	LGP970.AORFTL 1.0 Flexible	
6	MJN000001	Tape	MJN67849401	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
6	MJN000000	Tape	MJN67849501	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	EBR02	PCB Assembly, Flexible	EBR73418505	LGP970.ABYTTL 1.0 Flexible	
5	EBR070100	PCB Assembly, Flexible, Insert	EBR73495801	LGP970.AORFTL 1.1 Flexible	
6	MJN000001	Tape	MJN67767401	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
6	MJN000002	Tape	MJN67767402	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
6	MJN000000	Tape	MJN67849601	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	EBR070400	PCB Assembly, Flexible, SMT	EBR73418601	LGP970.ADEUZY 1.0 Flexible	
6	EAX010700	PCB, Flexible	EAX63991001	LGP970.ADEUZY 1.1 POLYI SBL 5 0.5 Flexible	

Level	Location No.	Description	PartNumber	Spec	Remark
6	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73418701	LGP970.ADEUZY 1.0 Flexible	
6	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73418901	LGP970.ADEUZY 1.0 Flexible	
7	SUMY00	Microphone, Condenser	SUMY0010609	SPU0410HR5H -PB SPU0410HR5H -PB, UNIT, 42 dB, 3.76*2.95*1.1, mems smd mic KNOWLES ACOUSTICS	
4	EBD00	Touch Window Assembly	EBD61045401	TSMC-G402A CAPACITIVE TOUCH G/G SYNAPTICS T1320 4 Inch B to B - LG INNOTEK., LTD.	
4	EAJ00	LCD, Module-TFT	EAJ61772201	TX10D10VM0EAA WVGA 4.0INCH 480X800 700CD COLOR 70% 16/9 1000:1 60Hz Inverter N - HITACHI DISPLAYS., LTD	
4	EAD00	Cable, Assembly	EAD61727901	UFL-2LPVHF-04N1TC-A84SLG UFL-LP-066 UFL-LP-066 0.084M 2 WHITE none N HIROSE KOREA CO., LTD	
4	EAB01	Receiver	EAB62293401	BWBR1208L-07B-P 40mW 32OHM 105.5DB 300HZTO3.5HZ WIRE 1208*2.05T wire 10mm BUJEON ELECTRONICS CO., LTD	
4	ACQ01	Cover Assembly, Front	ACQ85429501	LGP970.ADEUZY ZZ:Without Color -	
5	MEG000000	Holder	MEG62758601	MOLD NBR LGP970.ADEUZY ZZ:Without Color -	
5	MJN000000	Tape	MJN67747101	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	MJN061100	Tape, Protect	MJN67767201	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	MDS000002	Gasket	MDS63635101	CUTTING TR 30 LGP970.ADEUZY ZZ:Without Color -	
5	MDS000000	Gasket	MDS63632601	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	MDS000001	Gasket	MDS63615301	COMPLEX LGP970.ADEUZY ZZ:Without Color CT20XT 0.03t	
5	MJN000002	Tape	MJN67879101	CUTTING TAPE LGP970.ADEUZY ZZ:Without Color 110323_SNIPER_TAPE_SPEAKER_FPC	
5	MJN000001	Tape	MJN67760201	CUTTING TAPE LGP970.ADEUZY ZZ:Without Color -	

Level	Location No.	Description	PartNumber	Spec	Remark
5	MDS000003	Gasket	MDS63650901	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	MJN061101	Tape, Protect	MJN67767301	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	MDJ000000	Filter	MDJ63107001	CUTTING BK7 LGP970.ADEUZY ZZ:Without Color -	
5	MBG00	Button	MBG64222501	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
5	MBG01	Button	MBG64202501	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
5	ADV000000	Frame Assembly	ADV73965501	LGP970.ADEUZY ZZ:Without Color -	
6	MCK032700	Cover, Front	MCK66664601	MOLD PC LGP970.ADEUZY ZZ:Without Color -	
6	MDQ000000	Frame	MDQ62896401	CASTING MG LGP970.ADEUZY ZZ:Without Color -	
4	MEZ000000	Label	MLAZ0038303	COMPLEX LG-LC3200 WA:White PRINTING, PPRI PRINTING	
4	MJN000	Tape	MJN67895201	CUTTING TAPE LGP970.ABYTTL ZZ:Without Color -	
4	GMEY01	Screw, Machine	GMEY0010402	GMEY0010402 BH + 1.4mM 2mM MSWR FZB N - SERVEONE CO., LTD.	
4	GMZZ00	Screw, Machine	GMZZ0019007	111111 FH + 1.4mM 1.5mM MSWR FZW N - SEAGATE TECHNOLOGY, INC.	
4	MAZ00	Bracket	MAZ63103301	PRESS STS 304 0.3 LGP970.ADEUZY ZZ:Without Color -	
4	MAZ01	Bracket	MAZ63131101	PRESS STS 304 0.15 LGP970.ADEUZY ZZ:Without Color -	
4	MBL01	Cap	MBL64897001	MOLD NBR LGP970.ADEUZY ZZ:Without Color -	
4	MCQ00	Damper, LCD	MCQ66584901	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MCQ01	Damper	MCQ66672501	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MCQ02	Damper	MCQ66707801	CUTTING SR LGP970.ABYTTL ZZ:Without Color -	
4	MCQ03	Damper	MCQ66707901	CUTTING SR LGP970.ABYTTL ZZ:Without Color -	

Level	Location No.	Description	PartNumber	Spec	Remark
4	MCQ04	Damper, LCD	MCQ66715401	CUTTING SR LGP970.ABYTTL ZZ:Without Color 20110221_P970_DAMPER_LCD2	
4	MCQ05	Damper	MCQ66719901	COMPLEX LGP970.ADEUZY ZZ:Without Color 110304_DAMPER_TOUCH_FPC	
4	MCQ06	Damper	MCQ66721401	COMPLEX LGP970.ADEUZY ZZ:Without Color 110308_damper_earjack3	
4	MCQ07	Damper, LCD	MCQ66726401	COMPLEX LGP970.ADEUZY ZZ:Without Color 110323_damperr_lcd_fpc	
4	MDJ00	Filter	MDJ63085501	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MEG00	Holder	MEG62778601	MOLD NBR LGP970.ADEUZY ZZ:Without Color -	
4	MEV00	Insulator	MEV63879301	COMPLEX LGP970.ADEUZY ZZ:Without Color 110323_SNIPER_TAPE_LCD_MASKING	
4	MEV01	Insulator	MEV63892701	CUTTING TAPE LGP970.ABYTTL ZZ:Without Color 20110217_P970_INSULATOR_LCD_FPC	
4	MEV02	Insulator	MEV63892801	CUTTING TAPE LGP970.ABYTTL ZZ:Without Color 2011.02.17_PP70_INSULATOR_TOUCH_WINDOW	
4	MHK00	Sheet	MHK63409901	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MHK01	Sheet	MHK63425501	CUTTING STEEL SUS301 LGP970.ADEUZY ZZ:Without Color -	
4	MHK02	Sheet	MHK63511701	PRESS STS . LGP970.ADEUZY ZZ:Without Color -	
4	MJN00	Tape, Window	MJN67747001	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MJN01	Tape, Window	MJN67751201	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MJN02	Tape	MJN67767401	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
4	MJN03	Tape	MJN67775401	CUTTING TAPE LGP970.ADEUZY ZZ:Without Color -	
4	MJN061100	Tape, Protect	MJN67780701	CUTTING TAPE LGP970.ADEUZY ZZ:Without Color -	

Level	Location No.	Description	PartNumber	Spec	Remark
3	EBR03	PCB Assembly, Main	EBR72710027	LGP970.ADEUTL 1.0 Main	
4	EBR071500	PCB Assembly, Main, Insert	EBR73480802	LGP970.ABYTTL 1.1 Main	
5	ABM00	Can Assembly, Shield	ABM73496701	LGP970.ADEUZY ZZ:Without Color Top Assy	
6	MEV000002	Insulator	MEV63793401	COMPLEX LGP970.ADEUZY ZZ:Without Color insulator top3	
6	MEV000001	Insulator	MEV63793301	COMPLEX LGP970.ADEUZY ZZ:Without Color Insulator top2	
6	MEV000000	Insulator	MEV63793201	COMPLEX LGP970.ADEUZY ZZ:Without Color Top Insulator top 1	
6	MBK070300	Can, Shield	MBK62935401	PRESS STS 0.15 LGP970.ADEUZY ZZ:Without Color -	
6	MEV000003	Insulator	MEV63793501	COMPLEX LGP970.ADEUZY ZZ:Without Color insulator top4	
6	MCQ000000	Damper	MCQ66718901	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	ABM01	Can Assembly, Shield	ABM73496801	LGP970.ADEUZY ZZ:Without Color -	
6	MBK070300	Can, Shield	MBK62915501	PRESS STS 0.15 LGP970.ADEUZY ZZ:Without Color -	
6	MCQ000000	Damper	MCQ66719001	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
6	MEV000000	Insulator	MEV63793601	COMPLEX LGP970.ADEUZY ZZ:Without Color insulator bottom1	
6	MEV000001	Insulator	MEV63793701	COMPLEX LGP970.ADEUZY ZZ:Without Color insulator bottom2	
5	MEV000000	Insulator	MEV63854901	COMPLEX LGP970.AGBRBK ZZ:Without Color -	
5	SVCY01	Camera Module	SVCY0022201	C5AA-Y258A CMOS, MEGA, 5M AF Sony(1/4"), 8.5x8.5x5.35t, MIPI, FPCB LG INNOTEK CO., LTD	
5	EBR04	PCB Assembly, Flexible	EBR73418508	LGP970.ABYTTL 1.0 Flexible	
6	EBR070400	PCB Assembly, Flexible, SMT	EBR73418604	LGP970.ADEUZY 1.0 Flexible	

Level	Location No.	Description	PartNumber	Spec	Remark
7	EAX010700	PCB, Flexible	EAX63990501	LGP970.ADEUZY F POLYI Multi 3 0.21 Flexible	
7	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73418704	LGP970.ADEUZY 1.0 Flexible	
7	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73418904	LGP970.ADEUZY 1.0 Flexible	
6	EBR070100	PCB Assembly, Flexible, Insert	EBR73529901	LGP970.ABYTTL 1.0 Flexible	
7	MCQ000000	Damper	MCQ66565001	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
7	MJN000000	Tape	MJN67855401	COMPLEX LGP970.AGBRBK ZZ:Without Color -	
5	MEV000001	Insulator	MEV63892301	COMPLEX LGP970.ADEUZY ZZ:Without Color -	
5	RAA050100	Resin, PC	BRAH0001301	UF-1060	
4	EBR071800	PCB Assembly, Main, SMT	EBR72710128	LGP970.ADEUTL 1.0 Main	
5	EBR071600	PCB Assembly, Main, SMT Bottom	EBR72710302	LGP970.ADEUZY 1.0 Main	
6	EAX010000	PCB, Main	EAX63969101	LGP970.ADEUZY 1.0 FR-4 Any Layer 10 0.65 MAIN	
5	MEZ000000	Label	MLAZ0038301	COMPLEX LG-VX6000 ZZ:Without Color PID Label 4 Array PRINTING,	
5	EBR071700	PCB Assembly, Main, SMT Top	EBR72710201	LGP970.ADEUZY 1.1 MAIN	
3	GMEY00	Screw, Machine	GMEY0011201	GMEY0011201 BH + 1.4mM 3mM MSWR FZB N N LG ELECTRONICS INC.	
3	MEZ002100	Label, Approval	MLAA0062316	COMPLEX GU280 OREBK ZZ:Without Color COMPLEX, (empty), , , , ,	
1	AAD000000	Addition Assembly	AAD85771425	LGP970.ADEUTL TL:Titanium Black -	
2	ACQ02	Cover Assembly, Battery	ACQ85555901	LGP970.ADEUZY ZZ:Without Color -	
3	MCK004100	Cover, Battery	MCK66664801	MOLD PC LGP970.ADEUZY ZZ:Without Color -	

Level	Location No.	Description	PartNumber	Spec	Remark
3	MCQ000000	Damper	MCQ66716401	CUTTING SR LGP970.ABYTTL ZZ:Without Color 110224_P970_DAMPER_SIM_CARD	
3	MJN061100	Tape, Protect	MJN67831801	CUTTING TAPE LGP970.ADEUZY ZZ:Without Color -	
1	AGF000000	Package Assembly	AGF76200904	LGP970.ADEUTL ZZ:Without Color TR1-1H_LGP970_ENG_ENG STD	
2	MCQ007000	Damper, Box	MPBA0007416	COMPLEX LGP970.ADEUZY ZZ:Without Color GSP2 Type_Phone Pad_Global SP(P970) Model for Only	
2	MEZ000000	Label	MLAZ0050901	COMPLEX KU990 GBRBK ZZ:Without Color -	
2	MEZ047200	Label, Master Box	MLAJ0004402	PRINTING CG300 CGR DG ZZ:Without Color LABEL MASTER BOX(for CGR TDR 2VER. mbox_label) GSM standard_master box label	
2	MEZ003500	Label, Barcode	MLAC0004541	PRINTING HB620 KPNBK ZZ:Without Color GSM standard_unit box label_90*40	
2	MHR007000	Sleeve, Box	MHR62133203	BOX SC 120 160 59 5 COLOR LGP970.ADEUTL ZZ:Without Color GSP2(TR1-1H)_LG-P970_ENG_ENG STD	
2	MAY047100	Box, Master	MBEE0059801	COMPLEX KS360 ACNRD ZZ:Without Color -	
2	AGJ000000	PALLET ASSY	APLY0003203	KE500 AREBK BK, ZZ, TDR TR1-1 ORG STD Palletizing	
3	MBEC00	Box, Carton	MBEC0003001	COMPLEX KU250 TMDBK ZZ:Without Color -	
3	MCCL00	Cap, Box	MCCL0001701	COMPLEX KG270 AREBK ZZ:Without Color -	
3	MPBZ00	Damper	MPBZ0219601	COMPLEX KM500 ROMBB ZZ:Without Color -	
3	MPCY00	Pallet	MPCY0012403	COMPLEX KG800 FRABK DB:DARK BLUE -	
2	MAY084000	Box, Unit	MAY64851007	COMPLEX LGP970.AORATL ZZ:Without Color GSP2 Type_Global SP Model for Only	

12.2 Replacement Parts <Main component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
7	CN101	Connector, I/O	ENRY0008801	GU073-5P-SD-E1500 GU073-5P-SD-E1500, 5, mm, ANGLE LS Mtron Ltd.	
7	CN102	Connector, BtoB	ENBY0053101	14-5804-014-000-829+ 14, mm, STRAIGHT, 0.40MM, MALE, KYOCERA ELCO KOREA SALES CO., LTD.	
7	U101	IC, Ambient Light Sensor	EUSY0388201	BH1621FVC BH1621FVC, WSOF6, 5, R/TP, 1.6*1.6 - WSOF6 R/TP 5P - ROHM Semiconductor KOREA CORPORATION	
7	C101, C102, C105	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
7	FL102, FL103	Filter, EMI/Power	SFEY0013501	EVRC18S03Q015010R ESD/EMI 0HZ 7.5pF 0H SMD R/TP AMOTECH CO., LTD.	
7	C107	Capacitor, Ceramic, Chip	ECCH0002001	C1005JB0J104KT000F 0.1uF 10% 6.3V Y5P - 30TO+85C 1005 R/TP - TDK CORPORATION	
7	U102	IC, Proximity	EUSY0376201	GP2AP002S00F GP2AP002S00F, 8, R/TP SHARP CORPORATION.	
7	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R - 55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
7	CN103	Connector, BtoB	ENBY0034201	GB042-24S-H10-E3000 24P 0.40MM STRAIGHT SOCKET SMD R/TP 1M - LS Mtron Ltd.	
7	J101	Jack, Phone	EAG62831701	KJA-PH-3-0176 4P 4P ANGLE R/TP 3.5M BLACK 5P 6.5x12.6x4.0t, Short Detect, All DIP type KSD CO., LTD	
7	CN102	Connector, BtoB	ENBY0051301	14-5804-040-000-829+ 40P 0.40MM STRAIGHT MALE SMD R/TP 900mM - KYOCERA ELCO KOREA SALES CO., LTD.	
7	VA103, VA104, VA105, VA107, VA108	Varistor	SEVY0010501	IECS0505C040FR 10V 0% 4E-12F 1.0x0.5x0.3 IEC61000-4-1 (ESD) level #4 SMD R/TP INNOCHIPS TECHNOLOGY	

Level	Location No.	Description	PartNumber	Spec	Remark
7	CN102, CN103	Connector, Terminal Block	ENZY0018801	25SMT-4442-01 0P A-LOGICS STRAIGHT SMD R/TP - W.L.GORE & ASSOCIATES INC	
7	C101, C102, C105	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
7	C107	Inductor, Multilayer, Chip	ELCH0003847	LQG15HS1N8S02D 1.8NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
7	SW101	Connector, RF	ENWY0003901	U.FL-R-SMT(10) 1.90MM STRAIGHT SOCKET SMD T/REEL CU 50OHM 300mDB HIROSE KOREA CO., LTD	
7	CN101	Connector, BtoB	ENBY0039501	GB042-20P-H10-E3000 20P 0.40MM STRAIGHT PLUG SMD R/TP 1M - LS Mtron Ltd.	
7	LD102, LD104, LD106, LD108	LED, Chip	EDLH0008501	SSC-HB105-LA BLUE 2.75~3.15 30mA 11~17mCD 462TO469nM 94.5mW 1608 R/TP 2P - SEOUL SEMICONDUCTOR CO., LTD	
7	LD101, LD103, LD105, LD107	LED, Chip	EDLH0011901	SSC-TWH104-HL WHITE 2.7~3.1 20mA 100~220mcd X(0.24~0.34) Y(0.25~0.34) 66mW 1608 R/TP 2P - SEOUL SEMICONDUCTOR CO., LTD	
8	CN102	Socket, Card	EAG62830201	104031-0811 SD 8P ANGLE SMD R/TP 11.95x11.40x1.42t, Push-pull type MOLEX	
8	U105	IC, Magnetic Sensor	EBD60945201	AK8975C 1.6~3.6 Geomagnetic Sensor - CSP R/TP 14P - ASAHI KASEI CORPORATION	
8	C108	Capacitor, Ceramic, Chip	ECCH0000113	MCH155A180J 18pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
8	C105	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
8	C115	Capacitor, Ceramic, Chip	ECCH0000147	MCH155CN222KK 2.2nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM.	
8	C107	Capacitor, Ceramic, Chip	ECCH0002001	C1005JB0J104KT000F 0.1uF 10% 6.3V Y5P -30TO+85C 1005 R/TP - TDK CORPORATION	
8	C112, C114	Capacitor, Ceramic, Chip	ECCH0007802	CL10A475KP8NNNC 4.7uF 10% 10V X5R -55TO+85C 1608 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
8	C104	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
8	C113	Capacitor, Ceramic, Chip	ECZH0001120	CC1005X7R1H392KT000F 3.9nF 10% 50V X7R -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
8	LD101	LED, Chip	EDLM0009701	EHP-C04/NT01A-P01/TR(LM) WHITE 3.35~4.15 1A 100~140lm x, y 6.6W - R/TP 2P - EVERLIGHT ELECTRONICS CO., LTD.	
8	D101, D102, D103	Diode, TVS	EDTY0009801	VSMF05LCC 5V 6V 12V 2A 25W SOT-963 R/TP 6P 5 PROTEK DEVICES INC.	
8	L101	Inductor, Wire Wound, chip	ELCP0009408	LQM2HPN1R0MG0 LQM2HPN1R0MG0, 1 uH, N, 2X2.5X1.0, R/TP, Chip power MURATA MANUFACTURING CO., LTD.	
8	J101	Card Socket	ENSY0024301	KP09N-6S-2.54SF SIM 6P ANGLE SMD R/TP - HIROSE KOREA CO., LTD	
8	R116	Resistor, Chip	ERHZ0000237	MCR01MZP5F2002 20KOHM 1% 1/16W 1005 R/TP - ROHM.	
8	R115	Resistor, Chip	ERHZ0000279	MCR01MZP5F3902 39KOHM 1% 1/16W 1005 R/TP - ROHM.	
8	R105, R107, R117	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
8	R113, R114	Resistor, Chip	ERHZ0000406	MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM.	
8	R108, R109, R110, R111	Resistor, Chip	ERHZ0000420	MCR01MZP5J151 150OHM 5% 1/16W 1005 R/TP - ROHM.	
8	R106	Resistor, Chip	ERHZ0000456	MCR01MZP5J2R2 2.2OHM 5% 1/16W 1005 R/TP - ROHM.	
8	R112	Resistor, Chip	ERHZ0000485	MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM.	
8	R101, R102, R103, R104	Resistor, Chip	ERHZ0000486	MCR01MZP5J473 47KOHM 5% 1/16W 1005 R/TP - ROHM.	
8	U102	IC, DC, DC Converter	EUSY0344406	RT8515 QFN, 16, R/TP, 2X3, IC, DC, DC ConverterIC, DC, DC Converter RICHTEK TECHNOLOGY CORP.	

Level	Location No.	Description	PartNumber	Spec	Remark
8	U104	IC, Acceleration Sensor	EUSY0410101	KXTF9 1.8V to 3.6V 400KHZ 12BIT 1SPS 1W LGA R/TP 10P Accelerometer Sensor - LGA R/TP 10P - KIONIX, INC.	
8	U103	IC, Gyro Sensor	EUSY0434601	MPU3050 1.8~3.6 Gyro Sensor - QFN R/TP 24P - INVENSENSE	
8	VA101, VA104	Varistor	SEVY0004401	ICVL0518400V500FR 18V 0% 40pF 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
8	CN101	Connector, BtoB	ENBY0035901	GB042-40P-H10-E3000 40P 0.4MM STRAIGHT PLUG SMD R/TP 1M - LS Mtron Ltd.	
6	R323	Resistor, Chip	ERHY0009501	MCR006YZPJ000 0OHM 5% 1/20W 0603 R/TP - ROHM.	
6	R301, R302	Resistor, Chip	ERHY0009306	MCR006YZPF1801 1.8KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	U305	IC, MCP, NAND	EAN61834101	H8MBX00U0MER-0EM 4096MBIT 1.7VTO1.95V 12.0x12.0x0.74 TR 168P DRAM FBGA - HYNIX SEMICONDUCTOR INC.	
6	R303, R304	Resistor, Chip	ERHY0009592	MCR006YZPJ202 2KOHM 5% 1/20W 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C212, C215, C216, C223, C224, C225, C226, C229, C230, C231, C232, C233, C234, C235, C236, C411, C413, C414, C415, C453, C455, C467, C468, C472, C476, C478, C479, C480, C489, C492, C495, C499	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C5004, C5008, C5012, C5014, C5015, C5016, C5034, C5035, C613, C614, C819, C822, C823, C825, C826, C827, C828, C829, C830, C847, C860, C863, C901, C904, C906	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R - 55TO+85C 0603 R/TP - TDK CORPORATION	
6	C841, C842, C843	Capacitor, Ceramic, Chip	ECCH0009514	MCH032A(AN)100DK 10pF 0.5PF 25V X7R - 55TO+125C 0603 R/TP - ROHM.	
6	U402	IC, PMIC	EAN61827101	TWL5034 2.1 to 5V adj 1.4W BGA R/TP 209P - TEXAS INSTRUMENTS KOREA LTD, HONGKONG BRANCH.	
6	C421, C422, C424, C426, C428, C430	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C465, C470	Capacitor, Ceramic, Chip	ECCH0009201	GRM033R60J473KE19D 47nF 10% 6.3V X5R - 55TO+85C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R230, R231, R411, R805, R920	PCB ASSY, MAIN, PAD SHORT	SAFP0000401	LG-LU3000 LGTBK, MAIN, A,	
6	X201, X402	Crystal	EXXY0018701	FC-135(12.5PF, +-20PPM) 32.768KHZ 20PPM 12.5PF 32*15 SMD R/TP SEIKO EPSON CORP	

Level	Location No.	Description	PartNumber	Spec	Remark
6	R601, R602	Resistor, Chip	ERHZ0000434	MCR01MZP5J1R0 1OHM 5% 1/16W 1005 R/TP - ROHM.	
6	C418, C907	Capacitor, Ceramic, Chip	ECZH0025920	GRM033R71C102K 1nF 10% 16V X7R - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R201, R204, R208, R209, R228, R229, R233, R234, R235, R236, R313, R315, R320, R413, R610, R919	PCB ASSY, MAIN, PAD OPEN	SAFO0000401	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM DNI	
6	FB802, FB803, FB804, FB805, FB806	Filter, Bead	SFBH0008101	BLM15AG601SN1D 600 ohm 1.0X0.5X0.5 25% 0.6 ohm 0.3A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C207, C208, C214, C407, C432, C434, C438, C439, C440, C441, C451, C452, C454, C456, C457, C459, C460, C461, C462, C463, C482, C483, C484, C485, C488, C491, C494, C498	Capacitor, Ceramic, Chip	ECCH0017301	CL03A105MQ3CSNH 0.000001F 20% 6.3V X5R -45TO+85C 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C5003, C5007, C5011, C5017, C5018, C5019, C5032, C820, C849, C855, C859	Capacitor, Ceramic, Chip	ECCH0017301	CL03A105MQ3CSNH 0.000001F 20% 6.3V X5R -45TO+85C 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	R202, R203, R207, R210, R217, R218, R219, R312, R314, R317, R318, R319, R321, R322	Resistor, Chip	ERHY0009526	MCR006YZPJ472 4.7KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C204, C209, C602, C846	Capacitor, Ceramic, Chip	EAE62286801	CL03A104KP3NNNC 0.0000001F 10% 10V X5R -55TO+85C 0603 R/TP 0.3 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C487, C490, C493, C497, C5002, C5006, C5010, C905	Capacitor, Ceramic, Chip	ECCH0000198	CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R -55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C101, C102, C105	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	R222, R224, R225, R226, R306, R406, R407, R408	Resistor, Chip	ERHY0009505	MCR006YZPJ103 10KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R901, R902, R903, R904, R905, R906, R907, R908, R909	Resistor, Chip	ERHY0009558	MCR006YZPF6802 68KOHM 1% 1/20W 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C202, C203, C206, C211, C213, C219, C237, C238, C5013, C844	Capacitor, Ceramic, Chip	ECCH0032801	GRM033R60J224M 0.00000022F 20% 6.3V X5R -55TO+85C 0603 R/TP 0.3MM MURATA MANUFACTURING CO., LTD.	
6	C220, C221, C423, C464	Capacitor, Ceramic, Chip	ECCH0017501	CL10A226MQ8NRNE 22uF 20% 6.3V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C419, C437, C450	Capacitor, Ceramic, Chip	ECCH0009520	MCH032A150JK 15pF 5% 25V X7R -55TO+125C 0603 R/TP - ROHM.	
6	FB601, FB602, L901	Filter, Bead	EAM62150501	CIC10J601NC_ 600 ohm 1.6X0.8X0.8 25% 0.15 ohm 0.75A SMD R/TP 2P 0 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R324	Resistor, Chip	ERHY0024501	RC0201JR-0736RL 36OHM 5% 1/20W 0603 R/TP - YAGEO CORPORATION	
6	C603, C617, C618, C619, C631, C632, C690	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C608, C609	Capacitor, Ceramic, Chip	ECZH0001217	GRM155R60J474K 470nF 10% 6.3V X5R -25TO+70C 1005 BK-DUP - MURATA MANUFACTURING CO., LTD.	
6	R804	Resistor, Chip	ERHZ0000204	MCR01MZP5F1003 100KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C433	Capacitor, TA, Conformal	ECTH0004808	TCM1A475M8R 4.7F 20% 10V 500mA -55TO+85C 9OHM - - SMD R/TP - ROHM.	
6	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C104	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	U202	IC, MCP, NAND	EUSY0425901	H8BCS0QG0MMR-46M NAND/1G SDRAM/512M 0VTO0V 8.0x9.0x1.0 TR 130P NAND+DRAM BGA - HYNIX SEMICONDUCTOR INC.	
6	C201, C302, C303, C417, C466, C471, C824	Capacitor, Ceramic, Chip	ECCH0009106	C0603X7R1C103KT 10nF 10% 10V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	
6	L805	Inductor, Multilayer, Chip	ELCH0004709	1005GC2T3N3SLF 3.3NH 0.3NH - 300mA 0.19OHM 4.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C865	Capacitor, Ceramic, Chip	ECCH0009103	C0603C0G1H101JT00NN 100pF 5% 50V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	
6	L401	Inductor, Multilayer, Chip	ELCH0003842	LQG15HSR10J02D 100NH 5% - 150mA 1.25OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	R708	Resistor, Chip	ERHZ0000213	MCR01MZP5F1203 120KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	U404	IC, LDO Voltage Regulator	EUSY0365101	RP101K302D RP101K302D, PLP1612-4B, 4, R/TP, LDO RICOH COMPANY, LTD.	
6	PT201	Thermistor, NTC	SETY0006301	NCP15XH103J03RC 10KOHM 5% 0V 0A 3.35KK SMD P/TP 1005size MURATA MANUFACTURING CO., LTD.	
6	R307	Resistor, Chip	ERHY0009541	MCR006YZPF4700 470OHM 1% 1/20W 0603 R/TP - ROHM.	
6	R311	Resistor, Chip	ERHY0009502	MCR006YZPJ100 10OHM 5% 1/20W 0603 R/TP - ROHM.	
6	R221	Resistor, Chip	ERHZ0003001	MCR01MZP5F3002 30KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	U301	IC, Application Processor	EAN61966001	OMAP3630-Non Package 1.8V TO 3.3V 100mA 27MHz 0 0 515P - BGA R/TP-T 515P TEXAS INSTRUMENTS KOREA LTD, HONGKONG BRANCH.	
6	C832	Capacitor, Ceramic, Chip	ECZH0000816	C1005C0G1H120JT000F 12pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

Level	Location No.	Description	PartNumber	Spec	Remark
6	CN1, CN10, CN11, CN2, CN3, CN4, CN5, CN6, CN9	Clip	MCGY0003801	COMPLEX LG-KH3900 KTF ZZ:Without Color -	
6	U805	Filter, Separator, FEM	SMZY0028001	RF5501 - - - RF5501, QFN, 12p, 2.0*2.0*0.5, SP3T+LNA for BT/WiFi with BCM4325/29/30 RF MICRO DEVICES INC	
6	U804	IC, LDO Voltage Regulator	EUSY0407101	BU28TD4WNVX SSON004, 4, R/TP, 2.8V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	
6	R604, R605	Resistor, Chip	ERHY0009539	MCR006YZPF20R0 20OHM 1% 1/20W 0603 R/TP - ROHM.	
6	C817, C834	Capacitor, Ceramic, Chip	ECZH0025908	GRM0335C1E8R0D 8pF 0.5PF 25V C0G - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C107	Inductor, Multilayer, Chip	ELCH0003847	LQG15HS1N8S02D 1.8NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	X401	Oscillator, Crystal	EXSY0023801	CSC3S260000BFVRS00 26 MHz, 50 PPM, 15 pF, SMD, 25*20*0.9, VX8560 RGB Convertor(ANA5603) clock, Pb-Free, 26MHz, 50PPM, 1.8V, 20, 25, 0.9, SMD, R/TP PARTRON COMPANY LIMITED	
6	C856, C857	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R310	Resistor, Chip	ERHZ0000493	MCR01MZP5J513 51KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C835, C851	Capacitor, Ceramic, Chip	ECCH0000112	MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C611, C612	Capacitor, Ceramic, Chip	ECCH0000163	C1005X5R473KDT 47nF 10% 10V X5R - 55TO+85C 1005 R/TP - NEOTECH CO., LTD	
6	L201, L202	Inductor, Wire Wound, Chip	ELCP0008007	MIPS2520D3R3M 3.3UH 30% - 1A 0.12OHM - - SHIELD 2.5X2X1MM NONE R/TP FDK CORPORATION.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	BAT401	Capacitor Assembly	SMZY0023501	PAS311HR-VG1 3.8 Backup Capacitor 0.03F, Module Assembly, KOREA TAIYO YUDEN.CO., LTD.	
6	C836	Capacitor, Ceramic, Chip	ECCH0000149	MCH155CN332KK 3.3nF 10% 50V X7R - 55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C401, C402	Capacitor, Ceramic, Chip	ECCH0007805	CL05A106MQ5NUNC 10uF 20% 6.3V X5R - 55TO+85C 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R205	Resistor, Chip	ERHZ0000477	MCR01MZP5J394 390KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C409, C410, C912	Capacitor, Ceramic, Chip	ECZH0025917	GRM0335C1E470J 47pF 5% 25V NP0 - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R220, R308, R309, R325, R405	Resistor, Chip	ERHY0009506	MCR006YZPJ104 100KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	L808	Inductor, Multilayer, Chip	ELCH0004727	1005GC2TR10JLF 100NH 5% - 100mA 2.3OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	L402, L403, L404	Inductor, Wire Wound, chip	ELCP0008009	MIPSA2520D1R0 MIPSA2520D1R0, 1 uH, N, 2.5x2.0x1.2, R/TP, MLCI, power inductor FDK CORPORATION.	
6	U610	IC, Analog Switch	EUSY0363501	FSA2268UMX_F113 uMLF , 10 , R/TP , 0.4ohm Audio Analog Switch , ; , IC, Analog Switch FAIRCHILD SEMICONDUCTOR HONG KONG LTD.	
6	C5023, C853, C903	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R - 55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C833, C850	Capacitor, Ceramic, Chip	ECCH0000110	MCH155A100D 10pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C5033, C601	Capacitor, Ceramic, Chip	ECZH0025916	GRM0335C1E330J 33pF 5% 25V NP0 - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R211	Resistor, Chip	ERHY0009303	MCR006YZPF1002 10KOHM 1% 1/20W 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	FL802	Filter, Dielectric	SFDY0003201	DEA162450BT-2096A1-H BPF 2.45GHZ 100MHz SMD R/TP 3P TDK CORPORATION	
6	U403	IC, LDO Voltage Regulator	EUSY0407501	BU18TD4WNVX SSON004, 4, R/TP, 1.8V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	
6	C228, C848	Capacitor, Ceramic, Chip	ECZH0001216	C1005X5R1A224KT000E 220nF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	U901	IC, MCP, eMMC	EUSY0431101	SDIN5D2-2G-974D 2GBYTE 2.7VTO3.6V, 2.7VTO3.6V, 2.7VTO3.6V 11.5x13.0x1.2 TR 153P MLC NAND FBGA 2GB eMMC v4.41 (32nm/MLC) SANDISK CORPORATION	
6	L806	Inductor, Wire Wound, chip	ELCP0009410	LQM2HPN3R3MG0 LQM2HPN3R3MG0, 3.3 uH, N, 2x2.5x1.0, R/TP, chip power MURATA MANUFACTURING CO., LTD.	
6	Q201	FET	EQFP0003601	NTJD4105CT1G P-CHANNEL MOSFET 20V +-12 660mA 0.63OHM 270mW SC70 R/TP 6P ON SEMICONDUCTOR	
6	R232	Resistor, Chip	ERHY0000132	MCR01MZP5F2202 22KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R112	Resistor, Chip	ERHZ0000485	MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C239, C240	Capacitor, Ceramic, Chip	ECCH0009504	MCH032A180JK 18pF 5% 25V NP0 -55TO+125C 0603 R/TP - ROHM.	
6	X802	Oscillator, TCXO	EXST0002301	1XTW38400FAA 384MHZ 2.5PPM 2.8V 3.2x2.5x0.9MM ; SMD R/TP DAISHINKU CORPORATION.	
6	R803	Resistor, Chip	ERHY0000128	MCR01MZP5F1502 15KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C862	Capacitor, Ceramic, Chip	ECCH0033301	GRM1555C1H680F 68pF 1% 50V C0G -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	U201	IC, Digital Baseband Processor, 3G	EUSY0409401	PMB9801 0 0 0 NONE NONE 316P - BGA R/TP 316P INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	C861	Capacitor, Ceramic, Chip	ECCH0000196	MCH155A0R75C 0.75pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	IC601	IC, Audio Sub System	EUSY0403901	WM9093ECS/R 1.71~5.5V 0W WLCSP R/TP 20P - WOLFSON MICROELECTRONICS PLC	

Level	Location No.	Description	PartNumber	Spec	Remark
6	ZD905	Diode, TVS	EDTY0009401	VMNZ6.8CST2R 5.5V 0 10V 0A 200mW SC70 R/TP 6P 5 ROHM.	
6	CN201	Connector, BtoB	ENBY0053801	24-5804-030-000-829+ 30P 0.40MM STRAIGHT FEMALE SMD R/TP 900mM - KYOCERA ELCO KOREA SALES CO., LTD.	
6	C427, C431	Capacitor, Ceramic, Chip	ECCH0005604	GRM188R60J106M 10000000 pF, 6.3V, M, X5R, TC, 1608, R/TP, 0.8 mm MURATA MANUFACTURING CO., LTD.	
6	L811	Inductor, Multilayer, Chip	ELCH0004109	LLV0603-FH2N7S 2.7NH 0.3NH - 250mA 0.23OHM 6GHZ 5 SHIELD NONE 0.6X0.3X0.3MM R/TP TOKO, INC.	
6	U302	IC, I/O Support Chip	EUSY0342403	NLSV2T244MUTAG 0.9 To 4.5v 1uA NA 8P - UDFN R/TP 8P ON SEMICONDUCTOR	
6	U803	IC Assembly	EUSY0433901	BCM43291SKUBG WLBGA , 181 , R/TP , WiFi(11bgn)+BT+FM(Rx), BT3.0+HS, 6.57x5.62x0.55, 182pin, 0.4p , ; , IC Assembly BROADCOM ASIA DISTRIBUTION PTE LTD	
6	C852	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R212	Resistor, Chip	ERHY0009301	MCR006YZPF1000 100OHM 1% 1/20W 0603 R/TP - ROHM.	
6	L807	Inductor, Multilayer, Chip	ELCH0004722	1005GC2T47NJLF 47NH 5% - 200mA 1.3OHM 1GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R227	Resistor, Chip	ERHY0008206	RC1005F430CS 43OHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	U703	IC, Charge Pump	EAN62028201	BD2812GU 2.7 to 5.5V adj 1.4W CSP R/TP 32P - ROHM Semiconductor KOREA CORPORATION	
6	C105	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R206	Resistor, Chip	ERHY0009518	MCR006YZPJ224 220KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	ZD701, ZD702	Diode, TVS	EDTY0010201	ESD9L5.0ST5G ESD9L5.0ST5G, SOD-923, 5 V, .15 W, R/TP, 0.5pF SCG HONG KONG SAR LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C212, C215, C216, C223, C224, C225, C226, C229, C230, C231, C232, C233, C234, C235, C236, C411, C413, C414, C415, C453, C455, C467, C468, C472, C476, C478, C479, C480, C489, C492, C495, C499	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C5004, C5008, C5012, C5014, C5015, C5016, C5034, C5035, C613, C614, C819, C822, C823, C825, C826, C827, C828, C829, C830, C847, C860, C863, C901, C904, C906	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R -55TO+85C 0603 R/TP - TDK CORPORATION	
6	U104	RF Module	SMRH0005501	SKY77529 MHz, MHz, EDGE Quad Tx Module for IFX Smarti UE. SPI Control, SKYWORKS SOLUTIONS INC.	
6	C1001	Capacitor, Ceramic, Chip	ECCH0042008	GRM0335C1E3R9BD01D 3.9 pF, 25V, B, C0G, TC, 0603, R/TP, 0.0000000000039, 0.1PF, 25V, C0G, -55TO+125C, 0603, R/TP, 0.3 mm MURATA MANUFACTURING CO., LTD.	
6	L811	Inductor, Multilayer, Chip	ELCH0004109	LLV0603-FH2N7S 2.7NH 0.3NH - 250mA 0.23OHM 6GHZ 5 SHIELD NONE 0.6X0.3X0.3MM R/TP TOKO, INC.	
6	CN1, CN10, CN11, CN2, CN3, CN4, CN5, CN6, CN9	Clip	MCGY0003801	COMPLEX LG-KH3900 KTF ZZ:Without Color -	
6	C126	Capacitor, Ceramic, Chip	ECZH0000822	C1005C0G1H1R5CT000F 1.5pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C201, C302, C303, C417, C466, C471, C824	Capacitor, Ceramic, Chip	ECCH0009106	C0603X7R1C103KT 10nF 10% 10V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	
6	L130, L131	Inductor, Multilayer, Chip	ELCH0001056	1005GC2T2N7SLF 2.7NH 0.3NH - 300mA 0.17OHM 5.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C502, C506	Capacitor, Ceramic, Chip	ECZH0003503	GRM188R61E105K 1uF 10% 25V X5R - 55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C170, C171, C808	Capacitor, Ceramic, Chip	ECCH0035101	GRM0335C1E1R8C 1.8 pF, 25V, C, C0G, TC, 0603, R/TP, 0.0000000000018, 0.25PF, 25V, C0G, -55TO+125C, 0603, R/TP, 0.3 mm MURATA MANUFACTURING CO., LTD.	
6	R201, R204, R208, R209, R228, R229, R233, R234, R235, R236, R313, R315, R320, R413, R610, R919	PCB ASSY, MAIN, PAD OPEN	SAFO0000401	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM DNI	
6	C101, C102, C105	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	R913	Resistor, Chip	ERHY0009503	MCR006YZPJ101 100OHM 5% 1/20W 0603 R/TP - ROHM.	
6	C856, C857	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C419, C437, C450	Capacitor, Ceramic, Chip	ECCH0009520	MCH032A150JK 15pF 5% 25V X7R -55TO+125C 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	R220, R308, R309, R325, R405	Resistor, Chip	ERHY0009506	MCR006YZPJ104 100KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C865	Capacitor, Ceramic, Chip	ECCH0009103	C0603C0G1H101JT00NN 100pF 5% 50V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	
6	C603, C617, C618, C619, C631, C632, C690	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R - 55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C204, C209, C602, C846	Capacitor, Ceramic, Chip	EAE62286801	CL03A104KP3NNNC 0.0000001F 10% 10V X5R - 55TO+85C 0603 R/TP 0.3 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L123	Inductor, Multilayer, Chip	ELCH0001048	1005GC2T10NJLF 10NH 5% - 250mA 0.42OHM 2.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C5033, C601	Capacitor, Ceramic, Chip	ECZH0025916	GRM0335C1E330J 33pF 5% 25V NP0 - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	L808	Inductor, Multilayer, Chip	ELCH0004727	1005GC2TR10JLF 100NH 5% - 100mA 2.3OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	FL601, FL602, FL702	Filter, EMI/Power	SFEY0015901	ICMEF214P101MFR ICMEF214P101MFR, SMD, ESD Common mode Filter INNOCHIPS TECHNOLOGY	
6	L117, L125	Inductor, Multilayer, Chip	ELCH0004707	1005GC2T1N5SLF 1.5NH 0.3NH - 300mA 0.13OHM 7GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C102, C142, C909	Capacitor, Ceramic, Chip	ECZH0000830	C1005C0G1H330JT000F 33pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R230, R231, R411, R805, R920	PCB ASSY, MAIN, PAD SHORT	SAFP0000401	LG-LU3000 LGTBK, MAIN, A,	

Level	Location No.	Description	PartNumber	Spec	Remark
6	R505	Resistor, Chip	ERHZ0000267	MCR01MZP5F3301 3.3KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	U102	IC, Voltage Detector	EUSY0415801	ADET-5000 , 10, TP, Power detector for IFX SUE, IC, Voltage DetectorIC, Voltage Detector AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	U601	IC, MM PMIC	EUSY0227205	LP8720TLX 2.7 To 5.5V Adj 1.2W CSP R/TP 20P - NATIONAL SEMICONDUCTOR ASIA PACIFIC PTE. LTD.	
6	R202, R203, R207, R210, R217, R218, R219, R312, R314, R317, R318, R319, R321, R322	Resistor, Chip	ERHY0009526	MCR006YZPJ472 4.7KOHM 5% 1/20W 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C207, C208, C214, C407, C432, C434, C438, C439, C440, C441, C451, C452, C454, C456, C457, C459, C460, C461, C462, C463, C482, C483, C484, C485, C488, C491, C494, C498, C5003, C5007, C5011, C5017, C5018	Capacitor, Ceramic, Chip	ECCH0017301	CL03A105MQ3CSNH 0.000001F 20% 6.3V X5R -45TO+85C 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C5019, C5032, C820, C849, C855, C859	Capacitor, Ceramic, Chip	ECCH0017301	CL03A105MQ3CSNH 0.000001F 20% 6.3V X5R -45TO+85C 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	CN903	Connector, BtoB	ENBY0051401	24-5804-040-000-829+ 40P 0.40MM STRAIGHT FEMALE SMD R/TP 900mM - KYOCERA ELCO KOREA SALES CO., LTD.	
6	FL102	Filter, Saw	SFSY0038701	SAFEB1G96FN0F00 SAFEB1G96FN0F00, 1960 MHz, 1.4*1.1*0.6, SMD, 1930M~1990M, IL 3.0, 5pin, U-B, 50-200, W-BAND II Rx MURATA MANUFACTURING CO., LTD.	
6	C418, C907	Capacitor, Ceramic, Chip	ECZH0025920	GRM033R71C102K 1nF 10% 16V X7R -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	CN102, CN103	Connector, Terminal Block	ENZY0018801	25SMT-4442-01 0P A-LOGICS STRAIGHT SMD R/TP - W.L.GORE & ASSOCIATES INC	
6	ZD601	Diode, TVS	EDTY0009601	Rclamp0521P.TCT 5V 6 5V 4A 100W - R/TP 2P 1 SEMTECH CORPORATION	
6	C1003, C196	Capacitor, Ceramic, Chip	ECCH0032901	GRM0335C1H2R7C 2.7pF 0.25PF 50V C0G - 55TO+125C 0603 R/TP 0.3MM MURATA MANUFACTURING CO., LTD.	
6	R911	Resistor, Chip	ERHY0009550	MCR006YZPF4702 47KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	L133	Inductor, Multilayer, Chip	ELCH0004105	LLV0603-FH1N2S 1.2NH 0.3NH - 300mA 0.14OHM 13GHZ 4 SHIELD NONE 0.6X0.3X0.3MM R/TP TOKO, INC.	
6	C113	Capacitor, Ceramic, Chip	ECCH0009217	GRM0335C1E560J 56pF 5% 25V X7R - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C101, C105, C106, C112	Capacitor, Ceramic, Chip	ECZH0000803	C1005C0G1H020CT000F 2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C841, C842, C843	Capacitor, Ceramic, Chip	ECCH0009514	MCH032A(AN)100DK 10pF 0.5PF 25V X7R - 55TO+125C 0603 R/TP - ROHM.	
6	R608	Resistor, Chip	ERHY0009547	MCR006YZPF2003 200KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	ZD703	Diode, TVS	EDTY0009101	ESD9X5.0ST5G 5V 6.2 12.3V 8.7A 107W SOD528 R/TP 2P 1 ON SEMICONDUCTOR	
6	CN901	Connector, BtoB	ENBY0036001	GB042-40S-H10-E3000 40P 0.4MM STRAIGHT SOCKET SMD R/TP 1M ENGINEERING PLASTIC UL94V-0 AU OVER NI LS Mtron Ltd.	
6	U105	IC, Power Amplifier	SMPY0020101	ACPM-5281-TR1 dBm, %, A, dBc, dB, 4x5, SMD, 3G Dual PAM B1+8. Coupler Integrated, LGA, R/TP, AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	FL801	Filter, Saw	SFSY0038901	SAFEB1G57KB0F00 SAFEB1G57KB0F00, 1575.42 MHz, 1.4*1.1*0.6, SMD, 1574.22M~1576.62M, IL 0.8, 5pin, U-U, 50-50, GPS LOW LOSS MURATA MANUFACTURING CO., LTD.	
6	R606, R607	Resistor, Chip	ERHY0009536	MCR006YZPF1003 100KOHM 1% 1/20W 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	FB901, FB902, FB903	Filter, Bead	SFBH0008105	BLM15BD182SN1D 1800 ohm 1.0X0.5X0.5 25% 1.4 ohm 0.1A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	CN103	Connector, BtoB	ENBY0034201	GB042-24S-H10-E3000 24P 0.40MM STRAIGHT SOCKET SMD R/TP 1M - LS Mtron Ltd.	
6	FL104	Filter, Saw	SFSY0030003	SAFEB881MFL0F55 881.5MHz 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	FL111	Filter, Saw	SFSY0028101	SAFEB1G95KA0F00 1950 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	U702	IC, Analog Switch	EUSY0317101	SLAS4717EPMTR2G - - - - WQFN R/TP 10P 1.8*1.4*0.75 ON SEMICONDUCTOR	
6	U801	IC, GPS	EUSY0415301	BCM4751IUB2G , 42, BCM4750 Shrink version 65nm, IC, GPS WLBGA R/TP 42P BROADCOM CORP	
6	R521	Resistor, Chip	ERHY0009504	MCR006YZPJ102 1KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	VA103, VA104, VA105, VA107, VA108	Varistor	SEVY0010501	IECS0505C040FR 10V 0% 4E-12F 1.0x0.5x0.3 IEC61000-4-1 (ESD) level #4 SMD R/TP INNOCHIPS TECHNOLOGY	
6	L103, L128	Inductor, Multilayer, Chip	ELCH0001049	1005GC2T6N8JLF 6.8NH 5% - 250mA 0.32OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	ZD904	Diode, TVS	EDTY0010101	ESD9B5.0ST5G ESD9B5.0ST5G, SOD-923, 5 V, 300 mW, R/TP, 15pF SCG HONG KONG SAR LTD.	
6	C5023, C853, C903	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R - 55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C409, C410, C912	Capacitor, Ceramic, Chip	ECZH0025917	GRM0335C1E470J 47pF 5% 25V NP0 - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	CN701	Connector, BtoB	ENBY0051001	GB042-10S-H10-E3000 10P 0.4MM STRAIGHT FEMALE SMD R/TP 1M - LS Mtron Ltd.	
6	ZD501, ZD902	Diode, TVS	EDTY0008602	PSD12-LF 12V 13.3 25.9V 21A 500W SOD323 R/TP 2P 1 PROTEK DEVICES INC.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	U501	IC, MUIC	EUSY0405401	MAX14526DEEWP MUIC , ; , IC, Analog Multiplexer CSP R/TP 20P MAXIM INTEGRATED PRODUCTS INC.	
6	L804	Inductor, Multilayer, Chip	ELCH0001430	LL1005-FHLR10J 100NH 5% - 150mA 2.2OHM 1.03GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	C138, C198	Capacitor, Ceramic, Chip	ECCH0000155	MCH153CN103KK 10nF 10% 16V X7R - 55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	X801	Oscillator, TCXO	EXST0002501	KT2520F26000ACW18TAK 26 MHz, 2 PPM, 10 pF, SMD, 2.5*2.0*0.8, 2ppm, 26, 1.8V, 2.5, 2.0, 0.8, SMD, R/TP KYOCERA CORP.	
6	C511	Capacitor, Ceramic, Chip	ECCH0005603	GRM188R61A225K 2.2uF 10% 10V X5R - 55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	U505	IC, Hall Effect Switch	EUSY0418401	BU52014HFV 1.6Vto3.6V Hall IC - HVSOF R/TP 5P - ROHM.	
6	L114, L812	Inductor, Multilayer, Chip	ELCH0004721	1005GC2T2N2SLF 2.2NH 0.3NH - 300mA 0.16OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C105	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	FL109	Filter, Saw	SFSY0037501	SAFEB897MAM0F00 897.5MHz 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	C110, C194	Capacitor, Ceramic, Chip	ECZH0000802	C1005C0G1H010CT 1pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C114, C118, C119, C125, C130, C133	Capacitor, Ceramic, Chip	ECZH0000846	C1005C0G1H8R2CT000F 8.2pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	L101, L102	Inductor, Multilayer, Chip	ELCH0004718	1005GC2T5N6SLF 5.6NH 0.3NH - 300mA 0.27OHM 3.2GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C487, C490, C493, C497, C5002, C5006, C5010, C905	Capacitor, Ceramic, Chip	ECCH0000198	CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R -55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C157, L109, L126	Inductor, Multilayer, Chip	ELCH0004705	1005GC2T8N2JLF 8.2NH 5% - 250mA 0.37OHM 2.8GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C929	Capacitor, Ceramic, Chip	ECCH0009226	GRM0335C1E390J 39pF 5% 25V X7R -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	L802	Inductor, Multilayer, Chip	ELCH0004713	1005GC2T6N8JLF 6.8NH 5% - 250mA 0.32OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	L113, L115	Inductor, Multilayer, Chip	ELCH0004708	1005GC2T2N7SLF 2.7NH 0.3NH - 300mA 0.17OHM 5.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	L105	Inductor, Multilayer, Chip	ELCH0004710	1005GC2T15NJLF 15NH 5% - 250mA 0.53OHM 2GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R211	Resistor, Chip	ERHY0009303	MCR006YZPF1002 10KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	C833, C850	Capacitor, Ceramic, Chip	ECCH0000110	MCH155A100D 10pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	FL107	Filter, Saw	SFSY0034701	SAFEA1G88KB7F00 1880 1.4*1.1*0.5 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	C605, C606, C607	Capacitor, Ceramic, Chip	ECZH0001511	C1608Y5V1A225ZT000N 2.2uF -20TO+80% 10V Y5V -30TO+85C 1608 R/TP - TDK KOREA COOPERATION	
6	D101, D102, D103	Diode, TVS	EDTY0009801	VSMF05LCC 5V 6V 12V 2A 25W SOT-963 R/TP 6P 5 PROTEK DEVICES INC.	
6	Q601	FET	EQFP0000101	2SJ347 P-CHANNEL MOSFET -20V -7 -0.05A 40OHM 100mW SSM R/TP 3P TOSHIBA	

Level	Location No.	Description	PartNumber	Spec	Remark
6	R402	Resistor, Chip	ERHY0009519	MCR006YZPJ243 24KOHM 5% 1/20W 0603 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C174, C807	Capacitor, Ceramic, Chip	ECZH0001002	C1005CH1H0R5BT000F 0.5pF 0.1PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C910	Capacitor, TA, Conformal	ECTH0001903	F980J226MMA 22 uF, 6.3V, M, L_ESR, 1608, R/TP NICHICON CORPORATION, EAST JAPAN SALES OFFICE	
6	R105	Resistor, Chip	ERHZ0000404	MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L107	Inductor, Multilayer, Chip	ELCH0005005	HK1005 27NJ 27NH 5% - 300mA 0.7OHM 1.6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	C197	Capacitor, Ceramic, Chip	ECCH0042005	GRM0335C1E8R2BD01D 8.2 pF, 25V, B, C0G, TC, 0603, R/TP, 0.0000000000082, 0.1PF, 25V, C0G, -55TO+125C, 0603, R/TP, 0.3 mm MURATA MANUFACTURING CO., LTD.	
6	ZD905	Diode, TVS	EDTY0009401	VMNZ6.8CST2R 5.5V 0 10V 0A 200mW SC70 R/TP 6P 5 ROHM.	
6	SW102	Connector, RF	ENWY0008701	MS-156C NONE STRAIGHT SOCKET SMD T/REEL AU 50OHM 400mDB HIROSE KOREA CO., LTD	
6	C421, C422, C424, C426, C428, C430	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C106	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R - 55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R504	Resistor, Chip	ERHZ0000298	MCR01MZP5F5600 560OHM 1% 1/16W 1005 R/TP - ROHM.	
6	C112, C114	Capacitor, Ceramic, Chip	ECCH0007802	CL10A475KP8NNNC 4.7uF 10% 10V X5R - 55TO+85C 1608 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	FL101	Filter, Saw	SFSY0024302	SAFEB1G84FA0F00 1842.5 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	L805	Inductor, Multilayer, Chip	ELCH0004709	1005GC2T3N3SLF 3.3NH 0.3NH - 300mA 0.19OHM 4.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	FL703, FL902	Filter, EMI/Power	SFEY0016301	ICMEF112P900M COMMON MODE NOISE FILTER 0HZ 0F 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	R916	Resistor, Chip	ERHZ0000206	MCR01MZP5F10R0 10OHM 1% 1/16W 1005 R/TP - ROHM.	
6	U602	IC, Comparator	EUSY0250501	NCS2200SQ2T2G NCS2200SQ2T2G, SC70, 5 PIN, R/TP, Comparator, pin compatible to EUSY0077701 - - SC70 R/TP 5P - ON SEMICONDUCTOR	
6	U103	IC, Power Amplifier	SMPY0020802	ACPM-5202-LR1 dBm, %, A, dBc, dB, 3.0*3.0*1.1, SMD, WBAND 2, CPL, 3 MODE, BYPASS CLAMPING, SMD, R/TP, AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	FB601, FB602, L901	Filter, Bead	EAM62150501	CIC10J601NC_ 600 ohm 1.6X0.8X0.8 25% 0.15 ohm 0.75A SMD R/TP 2P 0 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L119	Inductor, Multilayer, Chip	ELCH0004712	1005GC2T3N9SLF 3.9NH 0.3NH - 300mA 0.22OHM 4GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C109	Capacitor, Ceramic, Chip	ECZH0025911	GRM0335C1E120J 12pF 5% 25V C0G - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	U101	IC, RF Transceiver, 3G	EUSY0391101	PMB5703 2.68VTO3V 0W WF2SGA R/TP 143P INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	C121	Capacitor, Ceramic, Chip	ECZH0025902	GRM0335C1E2R2C 2.2pF 0.25PF 25V C0G - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R113, R114	Resistor, Chip	ERHZ0000406	MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C507	Capacitor, TA, Conformal	ECTH0002703	TCTAL1A107M8R 0.0001F 20% 10V 50UA - 55TO+125C 0OHM 3.2x1.6x1.1 NONE SMD R/TP ROHM CO., LTD.	
6	C239, C240	Capacitor, Ceramic, Chip	ECCH0009504	MCH032A180JK 18pF 5% 25V NP0 -55TO+125C 0603 R/TP - ROHM.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	U405	IC, LDO Voltage Regulator	EUSY0355601	RP104K281D-TR-F RP104K281D-TR-F, PLP1010-4, 4 PIN, R/TP, 150mA, 2.8V, Single LDO, Q Current 1uA Under RICOH COMPANY, LTD.	
6	C930	Capacitor, Ceramic, Chip	ECCH0042302	CL21A475KACLRNC 4.7 uF, 25V, K, X5R, HD, 2012, R/TP, 0.0000047, 10%, 25V, X5R, -55TO+85C, 2012, R/TP, 0.85 mm SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	CN502	Connector, Terminal Block	ENZY0030301	04-9254-004-032-868+ 4P 2.50MM ANGLE SMD R/TP - KYOCERA ELCO KOREA SALES CO., LTD.	
6	R105, R107, R117	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C169	Capacitor, Ceramic, Chip	ECCH0009506	MCH032A270JK 27pF 5% 25V NP0 -55TO+125C 0603 R/TP - ROHM.	
6	R910	Resistor, Chip	ERHY0009586	MCR006YZPF2201 2.2KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	L121	Inductor, Multilayer, Chip	ELCH0004115	LLV0603-FH8N2J 8.2NH 5% - 220mA 0.2OHM 3GHZ 6 SHIELD NONE 0.6X0.3X0.3MM R/TP TOKO, INC.	
6	R609	Resistor, Chip	ERHY0009507	MCR006YZPJ105 1MOHM 5% 1/20W 0603 R/TP - ROHM.	
6	FL110	Filter, Duplexer, IMT	SDMY0003001	B7697 2140000000 2112.4 to 2167.6 1950000000 1922.4 to 1977.6 2.2 1.8 2.5x2.0x0.89 DUAL SMD R/TP - EPCOS PTE LTD.	
6	R502	Resistor, Chip	ERHY0009516	MCR006YZPJ222 2.2KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	U506	IC, Fuel Gauge	EAN61958601	MAX17043G 2.5 to 4.5V Vbat 0W DFN R/TP 8P - MAXIM INTEGRATED PRODUCTS INC.	
6	R212	Resistor, Chip	ERHY0009301	MCR006YZPF1000 100OHM 1% 1/20W 0603 R/TP - ROHM.	
6	C401, C402	Capacitor, Ceramic, Chip	ECCH0007805	CL05A106MQ5NUNC 10uF 20% 6.3V X5R -55TO+85C 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	IC301	IC, Analog Switch	EAN61871401	FSUSB63 2.7~4.3V 400NSEC 45NSEC 0W MLP R/TP 12P 1 FAIRCHILD SEMICONDUCTOR HONG KONG LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	U802	Module, GPS	SMZY0016502	ALM-1612 2.7VTO3.6V 15mA DFN 12P 2.1x3.3x1.0MM AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	FL105	Filter, Saw	SFSY0024301	SAFEB942MFL0F00 942.5 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	U203	IC, Analog Switch	EUSY0347001	DG2735DN-T1-E4 MiniQFN-10L , 10 PIN, R/TP , 1.8X1.4X0.55, 0.6 Dual SPDT Analog Switch , ; , IC, Analog Switch VISHAY INTERTECHNOLOGY ASIA PTE LTD	
6	FL103	Filter, Saw	SFSY0029201	SAFEB2G14FA0F00 2140 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	U106	IC, RF Amplifier	EUSY0429801	BGA749N16 2.3*2.3*0.39 , 16 , R/TP , Quadband LNA for IFX , ; , IC, RF Amplifier INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	R106	Resistor, Chip	ERHY0000137	MCR01MZP5F2702 27KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	U504	IC, Motor Driver	EUSY0238306	ISA1000 2.4~3.6V 150mV~300mV 0W DFN R/TP 8P -	
6	U502	IC, Charger	EUSY0410801	RT9524 DFN, 10, R/TP, DFN Cal Test Mode Single Charger IC for Micro USB, IC, ChargerIC, Charger RICHTEK TECHNOLOGY CORP.	
6	R522	Resistor, Chip	ERHY0024601	RC0603J151CS 150OHM 5% 1/20W 0603 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L803	Inductor, Multilayer, Chip	ELCH0003818	LQG15HS9N1J02D 9.1NH 5% - 300mA 0.26OHM 3.4GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L801	Inductor, Multilayer, Chip	ELCH0004107	LLV0603-FH1N8S 1.8NH 0.3NH - 300mA 0.18OHM 8.5KHZ 4.5 SHIELD 0 0.6X0.3X0.3MM R/TP TOKO, INC.	
6	CN902	Connector, BtoB	ENBY0039601	GB042-20S-H10-E3000 20P 0.4MM STRAIGHT SOCKET SMD R/TP 1M - LS Mtron Ltd.	
6	C152, C814	Capacitor, Ceramic, Chip	ECCH0009216	GRM0335C1E220J 22pF 5% 25V X7R - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	L106	Inductor, Multilayer, Chip	ELCH0004704	1005GC2T4N7SLF 4.7NH 0.3NH - 300mA 0.23OHM 3.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	L601	Inductor, Wire Wound, chip	ELCP0008013	MIPSZ2012D2R2 MIPSZ2012D2R2, 2.2 uH, N, 2.0X1.2X1.0, R/TP FDK CORPORATION.	
6	U701	IC, Sub PMIC	EUSY0336503	AAT2870IUW-T1 CSP , 35 , R/TP , 3.1x2.6 , ; , IC, Sub PMIC Advanced Analogic Technologies HK Limited	
6	CN702	Connector, BtoB	ENBY0040601	GB042-30P-H10-E3000 - 0.40MM STRAIGHT MALE SMD R/TP - - LS Mtron Ltd.	
6	C852	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	CN904	Connector, BtoB	ENBY0053201	24-5804-014-000-829+ 14P 0.40MM STRAIGHT FEMALE SMD R/TP 900mM - KYOCERA ELCO KOREA SALES CO., LTD.	
6	VA501	Varistor	SEVY0003601	ICVL0505101V150FR 5.6V 0% 60F 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
6	X101	Oscillator, VCTCXO	EXSK0009601	1XXA26000FAA 26 MHz, 1 PPM, 10 pF, SMD, 2.5*2.0*0.8, Vctl 1.2+/-1.05V, 26, 1PPM, 2.5V, 2.5, 2.0, 0.8, SMD, R/TP DAISHINKU CORPORATION.	
6	C712	Capacitor, Ceramic, Chip	ECCH0035001	GRM033R60J683K 68 nF, 6.3V, K, X5R, HD, 0603, R/TP, 0.000000068, 10%, 6.3V, X5R, -55TO+85C, 0603, R/TP, 0.3 mm MURATA MANUFACTURING CO., LTD.	
6	FL108	Filter, Duplexer, IMT	SDMY0003101	ACMD-7606 942500000 925 to 960 897500000 880 to 915 3 2.7 2.5*2.0*0.85 DUAL SMD R/TP - AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	C173	Capacitor, Ceramic, Chip	ECZH0000841	C1005C0G1H560JT000F 56pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	FL701	Filter, EMI/Power	SFEY0010501	ICVE10184E150R101FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	L104	Inductor, Multilayer, Chip	ELCH0004701	1005GC2T12NJLF 12NH 5% - 250mA 0.48OHM 2.1GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	FL901	Filter, EMI/Power	SFEY0015301	NFM18PC104R1C3 ESD/EMI 0HZ 0.1uF 0H SMD R/TP MURATA MANUFACTURING CO., LTD.	
6	R311	Resistor, Chip	ERHY0009502	MCR006YZPJ100 10OHM 5% 1/20W 0603 R/TP - ROHM.	
6	FL106	Filter, Duplexer, PCS	SDPY0004701	ACMD-7407 ACMD-7407, 1880 MHz, 1960 MHz, 2.8 dB, 3.2 dB, 55 dB, 50 dB, 2.5*2.0*0.95, SMD, FBAR, Band2 Rx unbal. AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	
6	C150	Capacitor, TA, Conformal	ECTH0006701	298D226X0010M2T 0.000022F 20% 10V 22UA - 55TO+85C 8OHM 1.6x0.8x0.9 NONE SMD R/TP VISHAY INTERTECHNOLOGY ASIA PTE LTD	
6	R518	Resistor, Chip	ERHZ0000318	MCR01MZP5F8062 80.6KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C804	Capacitor, Ceramic, Chip	ECCH0009109	C0603X7R1H331KT00NN 330pF 10% 50V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	
6	L129	Inductor, Multilayer, Chip	ELCH0004703	1005GC2T1N0SLF 1NH 0.3NH - 300mA 0.12OHM 10GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R915	Resistor, Chip	EBC61835701	RC0402FR-071RL 1OHM 1% 1/16W 1005 R/TP - YAGEO CORPORATION	
6	C510	Capacitor, Ceramic, Chip	ECCH0009211	GRM0335C1E3R3C 3.3pF 0.25PF 25V X7R - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C104	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R - 55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	SW101	Connector, RF	ENWY0003901	U.FL-R-SMT(10) 1.90MM STRAIGHT SOCKET SMD T/REEL CU 50OHM 300mDB HIROSE KOREA CO., LTD	
6	L127	Inductor, Multilayer, Chip	ELCH0003828	LQG15HS2N4S02D 2.4NH 0.3NH - 300mA 0.15OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	C427, C431	Capacitor, Ceramic, Chip	ECCH0005604	GRM188R60J106M 10000000 pF, 6.3V, M, X5R, TC, 1608, R/TP, 0.8 mm MURATA MANUFACTURING CO., LTD.	

Level	Location No.	Description	PartNumber	Spec	Remark
6	C520	Capacitor, Ceramic, Chip	ECZH0001210	C1005Y5V1A474ZT000F 470nF -20TO+80% 10V Y5V -30TO+85C 1005 R/TP - TDK KOREA COOPERATION	

12.3 Accessory

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
3	EAN060000	Memory Card Assembly	EAN62109603	-	
4	EAN011400	IC, Memory Card, MICRO SD	EAN61826701	MMAGR02GUECA-2MBTN 2GBYTE 2.7VTO3.6V MICRO SD CARD 15.0x11.0x1.0MM TR 8P MicroSD Card 2GB SAMSUNG ELECTRONICS CO., LTD.	
2	AFN053800	Manual Assembly, Operation	AFN75472610	LGP970.ADEUTL ZZ:Without Color LGP970 manual assy for DEU	
3	MBM062600	Card, Quick Reference	MBM63397007	COMPLEX LGP970.ADEUTL ZZ:Without Color Application service information leaflet LGP970 Germany	
3	MBM087200	Card, Warranty	MCDF0001110	COMPLEX KP202 VDG ZZ:Without Color PRINTING, (empty),	
3	MFL053800	Manual, Operation	MFL67204204	COMPLEX LGP970.AORATL ZZ:Without Color LGP970 manual for ORA	
2	EAY060000	Adapters	SSAD0034701	STA-U13ER 90Vac~264Vac 5.1V 1A 5060 CE NONE NONE - SUNLIN ELECTRONICS CO., LTD	
2	EAB010200	Earphone, Stereo	SGEY0007612	EMB-LGE013STAC 3mW 16OHM 98DB 65HZTO112HZ 1.08M BLACK 3.5 L TYPE STEREO 4POLE PLUG - CRESYN CO., LTD	
2	EBX000000	Accessory, Data Cable	SGDY0018801	KCA-ET-5-0210 , 1.2M, MicroUSB5pin, BLACK, ID open, KSD CO., LTD	
2	EAC00	Rechargeable Battery, Lithium Ion	EAC61518301	BL-44JN PRISMATIC 3.7V 1.5AH 300mAH 61x44x4.4 65x44x4.8 ACE BLACK Bar type, Top cap Screw joint - LG Chem, LTD.	